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## The Classification of Halictine Bees: Tribes and Old World Nonparasitic Genera with Strong Venation<sup>1</sup>

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## ABSTRACT

This study segregates and describes the tribes of the subfamily Halictinae. The Nomioidini is the most distinctive, but has not usually been recognized as a tribe. The Old World non-parasitic Halictini with strong wing venation are revised to the subgeneric level. The recognized species are listed for revised faunas; otherwise trivial names are listed without indications of synonymies. American representatives of the Old World groups are included. The name *Patellapis* is resurrected for a large African group, divided into three subgenera, *Lomatalictus* n. subg., *Chaetalictus* n. subg., and *Patellapis* s. str. A related, large, African genus, *Zonalictus* n. g., is recognized. The primarily Oriental group *Pachyhalictus* is raised to the generic level and *Dicthyhalictus* n. subg. is described for its African representative. *Thrincohalictus* is raised to the generic level. Only three subgenera of *Thrinchostoma* are recognized, *Eothrinchostoma*, *Thrinchostoma* s. str., and *Diagonozus*. For *Halictus* the usual three subgenera *Seladonia*, *Vestitohalictus* and *Halictus* are recognized.

## INTRODUCTION

This work on the classification of sweat bees (Hymenoptera, Apoidea, Halictidae) was begun in order to provide a firmer basis for understanding halictine social evolution. The present paper is a segment in a larger study. When all the halictine groups have been included, a comprehensive account of the probable lines of descent and of the origins of sociality will be prepared.

The parasitic halictine groups were treated earlier (Michener, 1978), so that the numerous special features of parasitic genera may be excluded from further consideration. The result is important shortening of the descriptive material for the nonparasitic genera.

The three halictine tribes are characterized below. The genera of one of them, the Augochlorini, were revised by Eickwort (1969). The Nomioidini contains only a single genus and is treated below. The Halictini contains several nonparasitic genera. Two of them, possibly to be subdivided later, have the third and often the second transverse cubital veins and the second recurrent vein of the fore wing, at least in females, weakened relative to nearby veins. These genera, *Homalictus* and

*Lasioglossum* (including *Evylaeus*), are excluded from the present paper and will be treated later. Also excluded from this paper are a number of strictly American genera with strong distal wing venation. These are *Agapostemon*, *Caenohalictus*, *Habralictus*, *Paragapostemon*, *Pseudagapostemon*, *Rhinetula*, and *Ruizantheda*. These genera are not closely related to those treated below and will be the topic of a later study by R. B. Roberts. The remaining Halictini, those with strong wing venation found in the Old World, are the principal topic of the present paper. One such genus, *Halictus*, occurs also in the New World and its variations and species in New World are included.

In the descriptive material, noteworthy characters and especially those unique to a group are italicized to facilitate rapid use. In the generic descriptions for the Halictini, the various areas or characters are numbered, to facilitate quick comparison of particular features among genera.

The lists of species given for the various genera and subgenera are not exhaustive. They contain names of species of which I have seen authentic material, plus names added from the literature when descriptive information is adequate. Many species described in *Halictus* s. l., often with no indication of group characters and sometimes compared to unrelated species that are now

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in different genera, can be placed only by re-examination of type material.

For areas such as Africa for which no revisional studies exist, all names which I have been able to place as to genus or subgenus are included in the lists. For areas included in revisional studies or catalogues, synonymous names are excluded, often even when the published synonymy postdates the revisional studies. Such catalogues or revisions are those of Sandhouse (1941) and Michener (1951) for North America, Wille and Michener (1971) for the Neotropical region, and Blüthgen (1920, 1921, 1923a, b, 1924) and Ebmer (1969, 1976b) for the Palearctic region. Revisional treatments of *Pachyhalictus* and *Thrinchostoma* are indicated in the accounts of those genera.

Specific names marked by asterisks are placed on the basis of the literature only.

KEY TO THE TRIBES OF HALICTINAE

- 1. Anterior tentorial pits in clypeus, separate from epistomal suture although connected to suture by sulci; fimbria of metasomal tergum V of female not divided by longitudinal specialized area ..... Nomioidini
- .... Anterior tentorial pit in epistomal suture; fimbria of tergum V of female in nonparasitic forms divided by longitudinal median area of specialized fine, dense pubescence and punctation ..... 2
- 2. Longitudinal median specialized area of tergum V of female not divided by a cleft; metasomal tergum VII of male with a transverse ridge, usually carinate, forming a false apex beneath which the tergum is strongly reflexed to the morphological apical margin, surface above the transverse ridge usually with a recognizable hairless pygidial plate ..... Halictini
- .... Longitudinal median specialized area of tergum V of female divided by a deep cleft in the tergal margin; tergum VII of male without pygidial plate and without transverse premarginal ridge

or carina forming a false apex ..... Augochlorini

TRIBE NOMIOIDINI

This tribe consists of minute species with dull, metallic, greenish, bluish or brassy, or rarely black, head and thorax and yellow markings in both sexes, usually involving the clypeus, pronotal margin, often the scutellum and metanotum, parts of the antenna and legs, and bands across the metasomal terga.

Outer veins of forewings strong. Inner orbit rather strongly, angularly emarginate above middle. *Anterior tentorial pit at apex of sharp angle or sulcus deep into general dypeal area*, near upturned end of the large preapical transverse clypeal groove.

*Male:* Metasomal tergum VII without recognizable pygidial plate, but margin produced posteriorly; truncate or notched. Posterior margin thin, not reflexed anteroventrally as in Halictini. Sternum VIII with well developed spiculum as well as long apical process. Apex of sternum VI somewhat produced, but entire. Genitalia rather elongate, gonostylus longer than the rest of genital capsule, over twice as long as gonocoxite, without ventral reflexed flap, much exceeding penis valves; plane of dorsal bridge of penis valves vertical. Second tarsomere of hind leg narrowed toward base, freely articulated with basitarsus, as third is articulated to second.

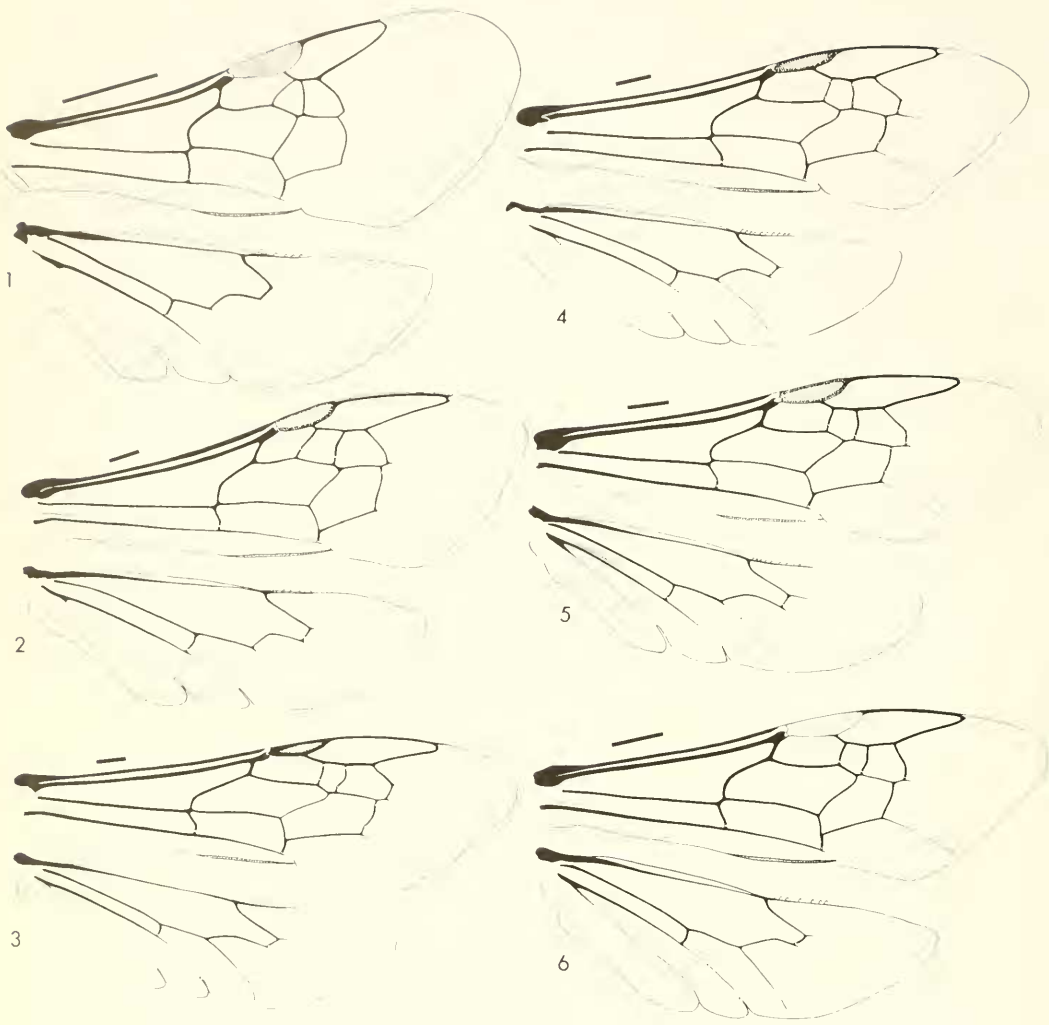
*Female:* Labrum not thickened, apical process minute, with few hairs, not keeled. Metasomal tergum V with apical margin and fimbria entire, without median slit or area of specialized texture or vestiture.

Genus *Nomioides* Schenck

Figures 1, 7-9

This is the only genus of the Nomioidini. It consists of minute, usually yellow and greenish black bees. A few characters that vary among genera in other tribes and that are therefore of interest in the present context are as follows:

Lower ends of paraocular areas angularly projecting into clypeus. Inner hind tibial spur of female coarsely pectinate with a very few large teeth. Strigilis ending bluntly, with radiating series of apical spines. Costal margin of marginal cell about as long as stigma, shorter than distance from apex of cell to wing tip; apex of marginal cell subtruncate or rounded. Lateral margins of metasoma with sharp angle separating dorsal from ventral parts of terga, the latter and the sterna often with long scopal hairs (angle less sharp in *N. minutissima* than in most species).



FIGS. 1-6. Wings of Nomioidini and Halictini. The scale lines represent 0.5 mm. 1. *Nomioides minutissima* (Rossi). 2. *Thrinchostoma* (*Thrinchostoma*) near *sjoestedti*. 3. *Halictus* (*Halictus*) *quadrimaculatus*. 4. *H.* (*H.*) *ligatus*. 5. *H.* (*H.*) *maculatus*. 6. *H.* (*Seladonia*) *hesperus*.

*Nomioides* ranges from southern Europe to southernmost South Africa, west as far as the Canary Islands, eastward to Madagascar and across Asia (north to the Caspian) to Taiwan and the Philippines, and southeast to Indonesia and Australia. It is common and represented by many species in arid and semiarid areas, but scarce and local in humid forested regions; it has not been found in New Guinea or islands

to the eastward, although present in various Sunda Islands. The genus was revised by Blüthgen (1925) with a supplement in 1934.

*Nomioides* appears to be divisible into two subgenera, as follows:

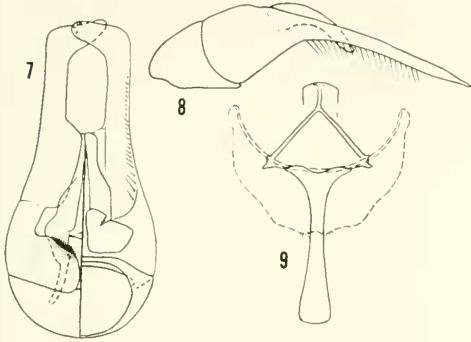
Subgenus *Nomioides* Schenck, s. str.

*Nomioides* Schenck, 1866, Berliner Ent. Zeitschr. 10:333. Type species: *Andrena pulchella* Jurine, 1807=*Apis minutissima* Rossi, 1790 (monobasic).

This subgenus contains those species in which the pale, dorsal, integumental bands are on the posterior margins of the metasomal terga.

#### TRIBE AUGOCHLORINI

This tribe is restricted to the Western Hemisphere and most of its species are strongly metallic green, blue, brassy, etc. A few, however, are weakly metallic (as is *Seladonia*) and a few almost completely lack metallic tints. Yellow or white markings are usually absent; if present they are limited to appendages, labrum, and lower half of clypeus of males.



FIGS. 7-9. *Nomioides minutissima* (Rossi), male. 7, 8. Dorsal, ventral and lateral views of genitalia. 9. Seventh and eighth sterna, the former shown in broken lines.

#### Subgenus *Ceylactus* Strand

*Ceylactus* Strand, 1913, Arch. Naturgesch., 79(A): 137. Type species: *Halictus horni* Strand, 1913 (monobasic).

*Cellaria* Friese, 1913 (not Ellis and Solander, 1786), Deutscher Ent. Zeitschr., p. 575. Type species: *Nomioides arnoldi* Friese, 1913 (monobasic).

*Cellariella* Strand, 1926, Arch. Naturgesch. 92(A):53 (new name for *Cellaria* Friese). Type species: *Nomioides arnoldi* Friese, 1913 (autobasic).

*Eunomioides* Blüthgen, 1937, Commentationes Biol., Soc. Sci. Fennica, 6:3 (no description or bibliographical reference). Type species: *Andrena variegata* Olivier, 1789, by original designation.

In this subgenus the pale, metasomal bands are on the median or basal parts of the terga. *Ceylactus* is not the name generally applied to this group, because Blüthgen proposed *Eunomioides* for it. However, *Ceylactus* has priority; moreover, *Eunomioides* was never described, nor was a bibliographic reference given. It was therefore not validly proposed. *Cellariella* easily falls into *Ceylactus* as here understood, differing by a single venational character.

Outer veins of forewings not weak. Inner orbit usually distinctly emarginate above middle of eye.

*Male:* Metasomal tergum VII without pygidial plate, without transverse premarginal carina and without zone below it reflexed to meet apex of sternum VI. Sternum VIII with spiculum. Sternum VI usually with median apical notch. Genitalia rather broad, gonostylus usually shorter than gonocoxite, without basal ventral flap; plane of dorsal bridge of penis valves horizontal so that bridge is entirely visible in dorsal view. Second tarsomere narrowly articulated to first, as third is to second.

*Female:* Labrum thick, except in parasitic forms with apical process bearing a strong longitudinal keel. Metasomal tergum V with median longitudinal minutely pilose or roughened area deeply notching into the prepygidial fimbria of long hairs, tergal margin in middle of this area deeply cleft; or in parasitic forms (*Temnosoma*), tergum V unmodified with continuous apical hairy area.

The genera of this tribe have been treated in detail by Eickwort (1969) and are not further dealt with in this paper.

#### TRIBE HALICTINI

This large tribe contains most Old World Halictinae as well as many of those of the New World. Species vary from minute to large, black to brilliantly metallic green or blue, usually without yellow markings in the female (the superficially *Nomioides*-like genus *Habralictus* is an exception) and with yellow if any restricted to the clypeus, antennae, and legs in males, less commonly (*Agapostemon* and related Neotropical genera) forming metasomal bands or present on pronotal lobes.

Outer veins of fore wings often weakened. Inner orbit usually not strongly emarginate.

*Male:* Metasomal tergum VII usually with recognizable although often poorly defined pygidial plate margined posteriorly by a transverse ridge or carina which forms the extremity or superficial apex of the tergum, above and behind the morphological posterior margin; area (sometimes only narrow marginal zone) beyond apex of plate reflexed, normally meeting posterior margin of sternum VI, occasionally pygidial plate reduced or absent, but even in such cases posterior part of tergum VII reflexed as indicated above. Sternum VIII without spiculum. Apex of sternum VI entire. Genitalia rather broad, gonostylus usually shorter than gonocoxite, often with basal ventral flap; plane of dorsal bridge of penis valves vertical. Second tarsomere of hind leg sometimes fused to first, sometimes articulated but with articulation broader than that of third to second, sometimes narrow at base like third.

*Female:* Labrum thick, except in parasitic forms with apical process bearing a strong longitudinal keel. Metasomal tergum V with median, longitudinal, minutely pilose area (absent in parasitic genera) deeply notching into the prepygidial fimbria of long hairs, but tergal margin not cleft.

Except for *Halictus*, the genera considered here all belong to a group of genera in which the metasomal sternum IV of the male is armed with coarse and sometimes gigantic setae or bristles and frequently shortened, mostly or wholly hidden by III. Only *Thrinchostoma orchidarum* and the subgenus *Lomatalictus* of *Patellapis* (perhaps only the one species of that subgenus whose male is known) are exceptions to this feature. This group of genera is primarily African although it also ranges across tropical Asia. The presence of a membranous retrorse basal lobe of the male gonostylus in all members of this group suggests a relationship to the *Lasioglossum-Homalictus* group, i.e., to the genera of Halictini with weakened distal wing venation. Such a lobe is absent in *Halictus*, although present in the Neotropical *Agapostemon* group.

KEY TO OLD WORLD NON-PARASITIC GENERA WITH STRONG APICAL WING VENATION

1. Female with margin of clypeal truncation, distal to preapical fimbria, ex-

tended downward at each side of labrum as a small, rather sharp, impunctate projection (except in some minute Asiatic species of the subgenus *Vestitohalictus* which lack such projections). Fourth sternum of male unmodified or at least without coarse, apical setae. Ventral basal process of male gonostylus absent or if present directed apically and resembling a second stylus ..... *Halictus*

.... Female with margin of clypeal truncation, distal to preapical fimbria, extending but little downward at each side of labrum, forming only a low rounded projection (except in some species of *Thrinchostoma* in which there is a strong projection). Fourth sternum of male usually shortened, commonly hidden by third sternum, nearly always with apical or subapical coarse setae. Ventral, basal process of male gonostylus present, directed ventrally or basally, forming a retrorse lobe ..... 2

2. Apical marginal areas of terga with simple, laterally directed hairs that usually form bands that are conspicuous only in certain lights. Profile of scutum in front gently convex, rising but little above level of pronotum. Pronotum with carina separating dorsal from declivous anterior surface. Recurrent veins both entering third submarginal cell or first recurrent entering extreme apex of second cell ..... *Thrinchostoma*

.... Apical marginal areas of terga variable, but without simple, laterally directed hairs. Profile of anterior part of scutum strongly convex, so that there is a subvertical surface rising well above level of pronotum and then curving strongly or angularly onto dorsum of scutum. Pronotum medially without carina separating dorsal from anterior surface. Recurrent veins entering second and third submarginal cells, each well before apex of its cell ..... 3

3. Malar area about as long (female) to twice as long (male) as diameter of

flagellum. Pygidial plate of male not defined. Gonostyli of male not bifurcate ..... *Thrincohalictus*

.... Malar area usually linear, rarely about half as long as diameter of flagellum. Pygidial plate of male defined at least posteriorly and posterolaterally by a carina. Gonostyli of male bifurcate, one branch sometimes slender and inconspicuous ..... 4

4. Metasomal terga with basal bands of tomentum. Pygidial plate of male rather small. Rami of male gonostylus subequal in thickness. Hind tibia of female with outer surface largely covered with rather short, nearly erect hairs of uniform length .... *Pachyhalictus*

.... Metasomal terga without basal bands of pale tomentum. Pygidial plate of male large. Outer ramus of male gonostylus much more slender than inner. Hind tibia of female with hairs on outer surface longer, slanting, as in most halictids ..... 5

5. First and frequently other metasomal terga usually with colored (blue, green, yellow, white) apical integumental bands. Thoracic pubescence long, plumose, usually yellowish; body almost without areas of short, whitish pubescence or tomentum as in many halictine groups. Clypeus of male often with yellow ..... *Zonalictus*

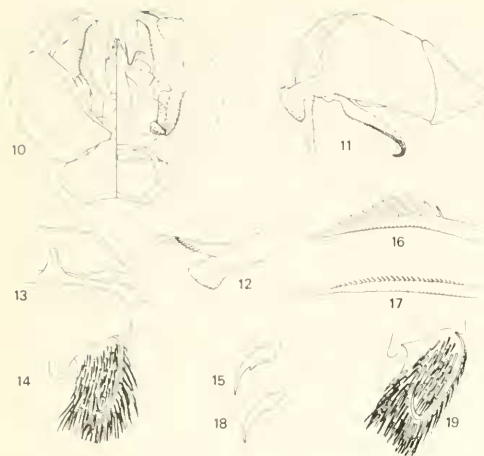
.... Tergal margins not colored. Thoracic pubescence usually shorter, less fully plumose, grayish or whitish; body often with areas of whitish pubescence or tomentum. Clypeus of male without yellow areas ..... *Patellapis*

### Genus *Patellapis* Friese

Figures 10-44

The hitherto little used name *Patellapis* is here applied in a much broader sense than previously. It becomes a substantial genus of African Halictini, encompassing species that exhibit much morphological diversity.

1. Nonmetallic black (sometimes with red metasoma), small to rather large, 5-14 mm long. 2 Punctuation ordinary, ground between punctures shining to dull. 3. Clypeus neither produced downward nor protuberant forward (except produced and protuberant when head is elongate, as in *P. braunsella*), less than three times (sometimes only twice) as broad as long, angle at end of truncation not or feebly produced, surface shining between punctures, uniformly gently convex. 4. Line between lower ends of eyes crossing clypeus below or above middle. 5. Malar space linear or about half as long as width of flagellum in *P. pastina*. 6. Paraocular area not extending down as lobe into clypeus, or forming an obtuse angle, or in *P. braunsella* a strong lobe. Mouthparts short (as in *Pachyhalictus*) to quite elongate; glossa in *P. braunsella* as long as face, more than twice as long as labial palpi, and postpalpal part of galea over twice as long as broad. 8. Pronotum with subhorizontal, dorsal surface medially about one third as long as flagellar width, often densely tomentose, margined anteriorly by declivity of pronotal surface, not by carina or sharp angle. 9. Dorsolateral angle of pronotum obtuse, not lamellate or strongly carinate, a weak carina often extending across posterior lobe of pronotum, a rounded ridge extending downward from dorsolateral angle. 10. Anterior extremity of scutum strongly convex in profile, the largely impunctate, vertical, anterior zone rising well above pronotum and curving onto dorsal surface without sharp line of separation. 11. Pre-episternal groove often short and shallow below scrobal groove. Metanotum not or partly tomentose. 12. Dorsal surface of propodeum longer than metanotum, shorter than to as long as scutellum, striate to granular; triangular area sometimes defined by end of striate or granular zone, broad when recognizable. Lateral and posterior surfaces of propodeum with or without short hairs in addition to long ones, these surfaces not areolate. Posterior surface of propodeum margined by carinae only below, laterally. 13. Apical wing veins strong, recurrent veins entering second and third submarginal cells. 14. Third submarginal cell a little elongate, third transverse cubital arcuate, usually straight toward costal margin of wing, or sinuate. 15. Marginal cell rather robust with free part distinctly less than twice as long as part subtended by submarginal cells, apex pointed very near wing margin or separated from it by about a vein width, not appreciably appendiculate. 16. First metasomal tergum much broader than long. 17. Terga without basal areas or bands of tomentum (very sparse tomentum on tergum II basolaterally in *P. braunsella*). Terga sometimes uniformly sparsely hairy, but more often with hairs denser and more plumose toward posterior margins of terga, often forming strong fasciae of plumose hairs on these margins as in *Halictus*. 18. Apical margins of terga broadly depressed with punctuation about as on more anterior parts, hairs not directed laterally or hairs in fasciae weakly so, only very narrow tergal margins impunctate and hairless, these margins or broader areas translucent and pallid. Discs of terga II and III sometimes with oblique hairs.



FIGS. 10-19. Structures of *Patellapis* (*Lomatalictus*). 10-16. *P. malachurina*. 17-19. *P. pallidicinctula*. 10, 11. Dorsal, ventral, and lateral views of male genitalia. 12. Posterior lateral view of male gonostylus. 13. Metasomal sterna VII and VIII of male. 14. Basitibial plate of female. 15. Claw of female. 16, 17. Inner hind tibial spurs of females. 18. Claw of female. 19. Basitibial plate of female.

*Male*: 19. Clypeus and legs without yellow or white areas. 20. Body of labrum two (in *P. braunsella*) to over three times as wide as long, fringed with bristles, without apical process or with a short triangular process, or in *P. schultzei* with strong, keeled apical process almost like that of a female. Mandible simple or in *Lomatalictus* bidentate. 21. Flagellum short to moderate in length, first segment broader than long, second and sometimes third and fourth broader than long to longer than broad, middle segments usually distinctly longer than broad, sometimes 1.5 times as long as broad. 22. Basitibial plate present or absent. 23. First two hind tarsal segments apparently articulated, but base of second broader than base of third. 24. Metasoma moderately robust, shaped about as in female, third segment widest or second and third equal. 25. Pygidial plate rather large, defined by strong carina both laterally and apically, smooth area longer than broad to slightly broader than long. 26. Sternum IV often short and largely or wholly hidden by III, usually with a series of bristles. Sternum V unmodified to broadly emarginate apically. 27. Sternum VII a transverse band with median apical projection; VIII with broadly rounded, truncate or emarginate apical projection, often with hairs. 28. Genitalia broad with somewhat narrow base (broad base in *P. schultzei*). Gonostylus bifid distally (upper branch sometimes delicate and difficult to see, especially in *P. schultzei*), more than half as long as gonobase, with retrorse, ventral, basal, membranous lobe which is sometimes bifid (e.g., in *P. schonlandi*). Penis valve rather slender and parallel sided in *P. schultzei* or rounded to obliquely truncate.

*Female*: 29. Scape reaching at least to anterior margin of anterior ocellus, sometimes as in *P. cincticauda* reaching middle of posterior ocellus. Second flagellar segment broader than long (about as broad as long in *P. montagui*), first and even third and others sometimes also broader than long. 30. Labrum with tapering apical process with keel; body of labrum more than twice as broad as long. 31. Hind tibia and its scopa of usual form. 32. Basitibial plate of moderate size, angular or rounded apically, margin elevated, surface dull or shining, with some hairs. 33. Inner hind tibial spur serrate to pectinate. Hind tibia with two apical spines, sometimes short and mere angles, or posterior one commonly absent, so that there is only one spine. 34. Sternal hairs simple to plumose, of moderate length.

*Patellapis* belongs to the group of genera with the apical wing venation strong and with the fourth metasomal sternum of males armed with bristles (except in the subgenus *Lomatalictus*) and nearly always shortened. It differs from *Pachyhalictus* by the lack of tomentous basal bands on the terga; the ordinary sculpturing and hind tibial shape and scopa of the female, these features being as in most halictines; the pointed marginal cell; the weakly carinate and nonlamellate dorsolateral pronotal angles; and by the large, well defined pygidial plate of the male with the smooth area usually longer than broad. It differs from *Zonalictus* by the lack of apical, colored tergal bands, the hairy and sometimes fasciate apical tergal margins, the shorter and less fully plumose pubescence of the head and thorax (except for *P. malachurina* and allies which resemble *Zonalictus* in this respect), the shorter and more robust form, etc. It would not have been illogical, however, to include *Zonalictus* as a subgenus of *Patellapis*.

#### KEY TO THE SUBGENERA OF *Patellapis*

1. Claws of female simple or with inner tooth very small, of male with the teeth close together. Fourth sternum of male similar in size and vestiture to third ..... *Lomatalictus*
- .... Claws toothed as usual in halictines. Fourth sternum of male usually shortened, often largely hidden under third,





FIG. 20. Top row: *Patellapis (Lomatalictus) malachurina*, face of male, face and wing of female. Bottom row: *Patellapis (Chaetalictus) pearstonensis*, wing and face of female, face of male. Scale line = 1.0 mm.

with a few to many coarse bristles in a transverse row ..... 2

2. Terga with conspicuous apical hair bands; basitibial plate margined both in front and behind, apex in female usually rounded ..... *Patellapis s. str.*

.... Terga without or with weak apical hair bands; basitibial plate not or incompletely defined on anterior margin, apex angulate or pointed .... *Chaetalictus*

The subgeneric classification is not entirely satisfactory. When more species are known from both sexes, it should be re-examined. There is great diversity within the genus and even within the subgenera.

*Lomatalictus* new subgenus

Figures 10-20

Type species: *Halictus malachurinus* Cockerell, 1937.

Clypeus only weakly convex in profile. Mandible of male bidentate. Claws of female with small inner tooth or in *P. pallidicinctula*, simple. Basitibial plate slender, narrowly rounded or angulate at apex in female, defined only along posterior margin and at apex in male. Inner hind tibial spur of female finely pectinate-serrate (in *P. pallidicinctula*) to pectinate. Metasomal tergal apices broadly pallid translucent with strong apical bands of plumose hairs. Fourth sternum of male unmodified. Penis valve without enlarged dorsal crest.

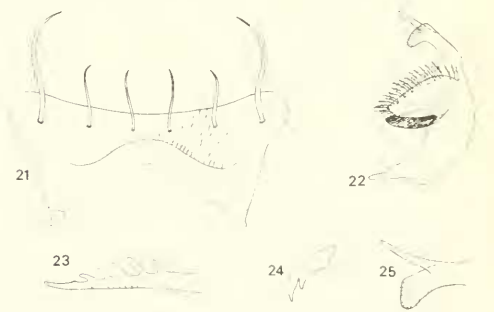
The male of *pallidicinctula* is unknown to me; the above comments on males are based on *P. malachurina*.

*Lomatalictus* is known only from South Africa. There may be only two species; *P. pallidicinctula* is clearly different from *malachurina*, but the other two names may both be synonyms of the latter.

Included names, all described in *Halictus* and all new combinations, are as follows:

- Patellapis (Lomatalictus) levisculpta* (Cockerell, 1939)
- Patellapis (Lomatalictus) malachurina* (Cockerell, 1937)
- Patellapis (Lomatalictus) pallidicinctula* (Cockerell, 1939)
- Patellapis (Lomatalictus) suprafulva* (Cockerell, 1946)

The name *Lomatalictus* is based on *lomatous*, fringes, plus *Halictus*, with reference to the apical bands of hairs on the metasomal terga.



FIGS. 21-25. *Patellapis (Chaetalictus) pearstonensis*. 21. Fourth sternum of male. 22. Gonocoxite and stylus of male in ventral view. 23. Inner hind tibial spur of female. 24. Claw of female. 25. Gonostylus of male in posterior lateral view.

*Chaetalictus* new subgenus

Figures 20-26

Type species: *Halictus pearstonensis* Cameron, 1905.

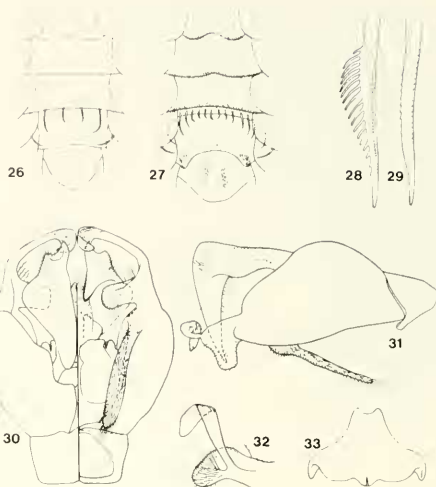
Clypeus markedly convex in profile. Mandible of male simple. Claws normal for halictines. Basitibial plate of female rather slender, weak on anterior margin, narrowly rounded to angulate at apex, as in

*Lomatolictus*; of male absent to small, undefined anteriorly, with angulate apex. Inner hind tibial spur of female finely pectinate-serrate (in *P. serifera*, as figured for *P. pallidicinctula*) to pectinate. Metasomal terga with translucent margins narrow to broad, apical hair bands weak or absent. Sternum IV of male of normal size to shortened, broadly emarginate, and hidden under III; it bears six enormous bristles or (in *P. rubrotibialis*) a row of often erect or retrorse bristles, only the lateral ones of which are large, or (in *P. pulchritens*) a row of rather weak bristles. Penis valve without enlarged dorsal crest.

This subgenus, known only from southern Africa, consists of species mostly smaller than those of *Patellapis s. str.*

Included names, all described in *Halic-tus* and all new combinations, are as follows:

- Patellapis (Chaetalictus) atricilla*  
(Cockerell, 1940)
- Patellapis (Chaetalictus) ausica*  
(Cockerell, 1945)
- Patellapis (Chaetalictus) calvini*  
(Cockerell, 1937)
- Patellapis (Chaetalictus) calviniensis*  
(Cockerell, 1934)
- Patellapis (Chaetalictus) capillipalpus*  
(Cockerell, 1946)
- Patellapis (Chaetalictus) chubbi*  
(Cockerell, 1937)
- Patellapis (Chaetalictus) cinctifera*  
(Cockerell, 1946)
- Patellapis (Chaetalictus) communis*  
(Smith, 1879)
- Patellapis (Chaetalictus) disposita*  
(Cameron, 1905)
- Patellapis (Chaetalictus) dispositina*  
(Cockerell, 1934)
- Patellapis (Chaetalictus) flavorufa*  
(Cockerell, 1937)
- Patellapis (Chaetalictus) leonis*  
(Cockerell, 1940)
- Patellapis (Chaetalictus) micropastina*  
(Cockerell, 1940)
- Patellapis (Chaetalictus) neli*  
(Cockerell, 1937)
- Patellapis (Chaetalictus) pastina*  
(Cockerell, 1937)



FIGS. 26-33. Structures of *Patellapis*. 26, 27. Metasomal sterna of males, with sparse hairs omitted, but areas of dense pubescence shown, of *P. (Chaetalictus) pearstonensis* and *P. (Patellapis) braunsella*. 28, 29. Inner hind tibial spurs of females, *P. (P.) montagnii* and *braunsella*. 30, 31. Dorsal, ventral and lateral views of male genitalia, *P. (P.) braunsella*. 32. Posterior lateral view of male gonostylus of same. 33. Eighth sternum of same.

- Patellapis (Chaetalictus) pastinella*  
(Cockerell, 1939)
- Patellapis (Chaetalictus) pastiniformis*  
(Cockerell, 1939)
- Patellapis (Chaetalictus) pearstonensis*  
(Cameron, 1905)
- Patellapis (Chaetalictus) pondoensis*  
(Cockerell, 1937)
- Patellapis (Chaetalictus) probita*  
(Cockerell, 1933)
- Patellapis (Chaetalictus) pulchritens*  
(Cockerell, 1937)
- Patellapis (Chaetalictus) rubrotibialis*  
(Cockerell, 1946)
- Patellapis (Chaetalictus) rufiventris*  
(Friese, 1925) (not *Halic-tus rufiventris* Giraud, 1861)  
Presumably a synonym of *pearstonensis* and hence not in need of a new name.
- Patellapis (Chaetalictus) sanguinibasis*  
(Cockerell, 1939)

- Patellapis (Chaetalictus) schonlandi*  
(Cameron, 1905)
- Patellapis (Chaetalictus) semipastina*  
(Cockerell, 1940)
- Patellapis (Chaetalictus) serrifera*  
(Cockerell, 1937)
- Patellapis (Chaetalictus) spinulosa*  
(Cockerell, 1941)
- Patellapis (Chaetalictus) tenuihirta*  
(Cockerell, 1939)
- Patellapis (Chaetalictus) terminalis*  
(Smith, 1853)
- Patellapis (Chaetalictus) vambensis*  
(Cockerell, 1940)
- Patellapis (Chaetalictus) villosicauda*  
(Cockerell, 1937)
- Patellapis (Chaetalictus) volutatoria*  
(Cameron, 1905)

Subgenus *Patellapis* Friese, s. str.

Figures 27-44

*Patellapis* Friese, 1909, Die Bienen Afrikas, p. 148, in L. Schultze, Zoologische und anthropologische Ergebnisse einer Forschungsreise im westlichen und zentralen Südafrika, vol. 2, part 2.

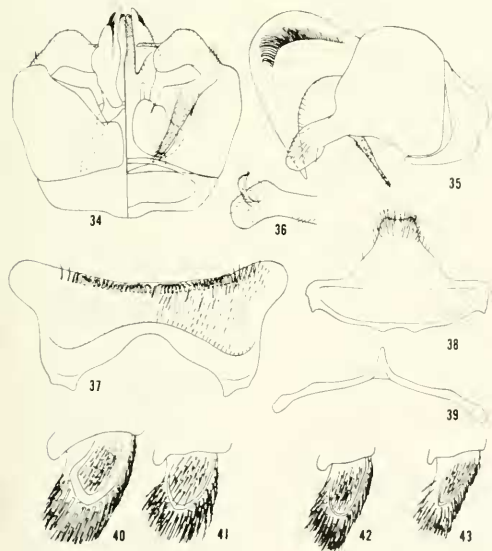
Type species: *Halictus (Patellapis) schultzei* Friese, by designation of Cockerell, 1920, Ann. Durban Mus., 2:311.

Agrees with description of *Chaetalictus* except as follows: Mandible of male simple or in *minutior* bidentate. Basitibial plate of female rather broad, margin well defined throughout, not weak on anterior side, apex rounded or weakly angulate; of male similarly broad and well defined in *P. schultzei*, narrower, pointed apically, but defined by carina at least part way up anterior margin in other species. Inner hind tibial spur of female weakly serrate to pectinate. Metasomal terga with broad translucent pallid margins and strong apical bands of plumose hair. Sternum IV of male unmodified in shape (in *P. "minutior"*) to shortened, broadly concave apically, and largely hidden by III, in all species with a transverse row of coarse bristles, the lateral ones greatly enlarged in *P. braunsella*, but not in others. Penis valve with median dorsal carina greatly expanded to form apically directed helmet-like crest.

This subgenus, known only from Cape Province, South Africa, contains the following species:

- Patellapis (Patellapis) braunsella*  
new species
- Patellapis (Patellapis) cincticauda*  
(Cockerell, 1946) new comb.
- Patellapis (Patellapis) minutior*  
(Friese, 1909)
- Patellapis (Patellapis) montagui*  
(Cockerell, 1941) new comb.
- Patellapis (Patellapis) schultzei*  
(Friese, 1909)

The specimen of *P. minutior* used for this study was labeled "typus" by Friese and is in the American Museum of Natural History. Other specimens, similarly labeled, in the Berlin museum are a different species of the same subgenus, with simple mandibles and other features not agreeing with my comments on *minutior*. Presumably the Berlin specimens are the true *minutior*. I have therefore placed the name in quotes where reference is to the



FIGS. 34-43. Structures of *Patellapis (Patellapis)*. 34, 35. Dorsal, ventral and lateral views of male genitalia of *Patellapis (P.) schultzei*. 36. Posterior lateral view of gonostylus of same. 37-39. Fourth, eighth, and seventh sterna of same. 40, 41. Basitibial plates of female and male, *P. (P.) schultzei*. 42, 43. Basitibial plates of female and male, *P. (P.) braunsella*.



FIG. 44. Top row: *Patellapis (Patellapis) schultzei*, face of male and *P. (P.) montagui*, face and wing of female. Middle row: *Patellapis (P.) braunsella*, face of male, face and wing of female. Bottom row: *Zonalictus albofasciatus*, face of male, face and wing of female. Scale line = 1.0 mm.

specimen in the American Museum. It does not seem to me appropriate to name the species at present, since I have seen only a single specimen in poor condition.

*P. cincticauda* is placed in this subgenus hesitantly, since I have seen no males and have not examined specimens since recognizing the limits of this group. The genitalia of *P. schultzei* and *P. braunsella* are quite different as illustrated, but those of *P. "minutior"* are intermediate in gonobase width and some other features.

Great diversity within as well as between the subgenera of *Patellapis* sometimes confuses the subgeneric limits. The bristles of the fourth sternum of the male in *P. braunsella* are greatly enlarged laterally, suggesting *P. (Chaetalictus) rubrotibialis*. The size and shape of the same sternum (not shortened) in *P. "minutior"* suggest *Lomatalictus*, as do the bidentate mandibles of the male. The one female specimen of a minute and presumably undescribed species of *Chaetalictus* has claws with only a small inner tooth, like those of *P. (Lomatalictus) malachurina*. There are very striking differences among species of at least the genera *Patellapis* and *Chaetalictus*, and the subgenera here recognized may be inadequate to properly reflect this diversity, or the limits of the subgenera recognized may not be ideal. One of the major problems is that for too many species only one sex is known, so that the full suite of specific characters is not available. The classification presented above is, therefore, tentative and conservative in that few subgenera are named. When both sexes are known for most of the species, more subgenera may be desirable.

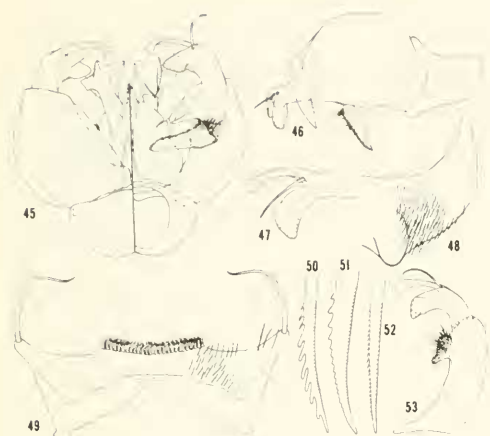
### *Zonalictus* new genus

Figures 44-53

*Halictus albofasciatus*-Gruppe, Blüthgen, 1929, Mitt. Zool. Mus. Berlin, 15:29.

Type species: *Halictus albofasciatus* Smith.

1. Nonmetallic black (sometimes with a partly red metasoma), usually with white, yellow, greenish, or bluish apical, integumental bands on terga; 6.5-14 mm long. 2. Surface of head and thorax commonly dull; frons and usually dorsum of thorax finely reticulate, the latter sometimes with punctures of two sizes intermixed, rarely shining with scattered punctures. *Pubescence long, plumose, commonly yellowish*, there being almost no areas of short, whitish, pubescence or tomentum as in most halictine groups [but *Patellapis (Lomatalictus) malachurina* and its relatives are similar in this respect]. 3. Clypeus neither produced downward nor protuberant forward (except strongly produced downward in the long-headed species *Z. zacephalus*), two to three times as broad as long, angle at end of truncation not or feebly produced, surface sometimes shining, but usually dull basally, large punctures often limited to distal half of clypeus; clypeal profile sometimes uniformly convex, but usually flat basally and strongly convex distally. 4. Line between lower ends of eyes crossing clypeus below or above middle. 5. Malar space linear. 6. Paraocular area not extending down as lobe into clypeus, or forming an obtuse lobe or angle. Mouthparts short and ordinary or in *Z. zacephalus*, glossa over half as long as face, in *Z. concinnulus* glossa longer than face and first two segments of labial palpus much elongated. 8. Pronotum with dorsal surface medially not defined, sloping anteriorly, but elsewhere defined anteriorly by declivity of pronotal surface, not by carina; dorsal surface (collar) often weakly tomentose. 9. Dorsolateral angle of pronotum obtuse, not lamellate or carinate, a ridge (often weak) extending laterally in some species across pronotal lobe, a rounded or sometimes sharp ridge extending downward from dorsolateral angle. 10. Anterior extremity of scutum as described for *Patellapis*. Preepisternal groove as described for *Patellapis*. Metanotum not or scarcely tomentose. 12. Dorsal surface of propodeum usually as long as scutellum, sometimes slightly shorter, finely granular or granulostriate; triangular area sometimes defined by weak carinae, usually not defined, when recognizable, broad. Lateral and posterior surfaces of propodeum without short hairs in addition to long ones, not areolate. Posterior surface margined by carinae only below laterally. 13. Wing venation as in *Patellapis*, but marginal cell more slender. 16. First metasomal tergum broader than long or in some males longer than broad. 17. Terga without basal areas or bands of tomentum (rarely very feeble tomentum basolaterally on tergum II, as in *Z. alboflosus*), without apical hair bands, hairs smaller and commonly sparser on apical parts of terga 1-4 than elsewhere, *these margins usually highly colored, at least on tergum 1, forming white, yellow, greenish, or bluish integumental bands*. 18. Apical margins of terga broadly and weakly depressed, not punctate, but with hairs similar to but smaller than those on rest of terga, hairs not directed laterally; margins of terga hairless, not translucent when highly colored, but broadly



FIGS. 45-53. Structures of *Zonalictus*. 45, 46. Dorsal, ventral and lateral views of male genitalia of *Z. albofasciatus*. 47. Posterior lateral view of stylus of same. 48. Seventh tergum of same. 49. Fourth sternum of same. 50-52. Inner hind tibial spurs of females of *Z. partitus*, *albofasciatus*, and *zacephalus*. 53. Ventral view of male gonocoxite and gonostylus of *Z. cincutulellus*.

translucent when not colored. Discs of terga II and III without oblique hairs.

*Male*: 19. Clypeus often with apical transverse yellow area; labrum often partly yellow; legs without yellow. 20. Labrum usually over three times as wide as long, without or with a barely evident apical process, but in *Z. concinnulus* only about twice as wide as long because of a strong, triangular apical process (not keeled). Mandible simple (bidentate in *Z. concinnulus*). 21. Flagellum elongate, first segment a little broader than long, other segments much longer than broad. 22. Basitibial plate present and well defined to nearly absent with only the apex distinct. 23. First two hind tarsal segments articulated as in *Patellapis*. Metasoma rather elongate, widest at segments 2 and 3. 25. Pygidial plate moderately large, defined by a strong carina both laterally and apically, smooth area usually longer than broad. 26. Sternum IV shortened, largely hidden by III, sometimes with a series of coarse bristles becoming progressively larger laterally (as in *Patellapis braunsella*), but usually with a series of erect or retrorse bristles of uniform size medially and one enormous, isolated, largely hidden, lateral bristle at each side. 27. Sternum VII a transverse band with median apical projection; VIII with produced apex emarginate. 28. Genitalia broad with somewhat narrow base. Gonostylus bifid distally, more than half as long as gonobase, with retrorse, ventral, basal, membranous lobe which may be large and bifid or may be much reduced in size. Penis valve rather slender, dorsal keel not expanded as in *Patellapis s. str.*, inferior basal process broadly rounded or subtruncate at apex.

*Female*: 29. Scape reaching posterior ocellus. Second flagellar segment as long as broad or usually broader than long, others commonly longer than broad, but mostly broader than long in some species (e.g., *Z. zacephalus*). 30. Labrum with tapering or sometimes rounded apical process with keel, body of labrum more than twice as broad as long. 31. Hind tibia and its scopa of the usual form. 32. Basitibial plate of moderate size, angular or narrowly rounded apically, margin elevated throughout or anterior margin largely absent so that plate is defined only apically and posteriorly; surface of plate with some hairs. 33. Inner hind tibial spur usually coarsely serrate to pectinate with short teeth, but in *Z. zacephalus* finely ciliate-serrate. Hind tibia with one tibial spine. 34. Sternal hairs short to moderate in length, simple to plumose, not suggestive of a scopa.

*Zonalictus* is closely related to *Patellapis* and could easily be incorporated into that genus as a subgenus. Because of its rather elongate form, the long, yellowish plumose hairs, and the integumental color bands on the apices of the metasomal terga (very rarely absent but often limited to tergum I or I and II), it has a different appearance from *Patellapis* or other halictids. Because of this fact, and other characters which are not invariable, such as the yellow on the clypeus of the male, the usually longer male antennae, and the commonly dull integumental surfaces between punctures, I have hesitantly accorded *Zonalictus* generic status.

*Zonalictus* is found throughout sub-Saharan Africa and eastward to Madagascar, Socotra, and Yemen. The specific names known to be included are listed below. Names preceded by an asterisk are placed here on the basis of literature only.

*Zonalictus aberdaricus* (Cockerell, 1945)

\**Zonalictus abessinicus* (Friese, 1916)

*Zonalictus albofasciatus* (Smith, 1879)

*Zonalictus albofilosus* (Cockerell, 1937)

*Zonalictus albolineolus* (Meade-Waldo, 1916)

*Zonalictus alopex* (Cockerell, 1937)

*Zonalictus andersoni* (Cockerell, 1945)

\**Zonalictus andreniformis* (Friese, 1925)

\**Zonalictus andrenoides* (Friese, 1909)

- Zonalictus baralongus* (Cockerell, 1939)  
 \**Zonalictus bilineatus* (Friese, 1909)  
*Zonalictus broomi* (Meade-Waldo, 1916), *nomen nudum*  
*Zonalictus burunganus* (Cockerell, 1937)  
 \**Zonalictus burungensis* (Cockerell, 1937)  
*Zonalictus cerealis* (Cockerell, 1945)  
*Zonalictus cinctulellus* (Cockerell, 1946)  
*Zonalictus concinnulus* (Cockerell, 1946)  
 \**Zonalictus flavofasciatus* (Friese, 1915)  
*Zonalictus flavovittatus* (Kirby, 1900)  
*Zonalictus fuliginosus* (Cockerell, 1937)  
*Zonalictus gowdeyi* (Cockerell, 1937)  
*Zonalictus grandior* (Blüthgen, 1929)  
*Zonalictus hargreavesi* (Cockerell, 1946)  
*Zonalictus heterozonicus* (Cockerell, 1937)  
*Zonalictus kabetensis* (Cockerell, 1937)  
 \**Zonalictus kamerunensis* (Friese, 1914)  
 (This is the first of two forms to which Friese gave the same trivial name on the same page.)  
*Zonalictus kavirondicus* (Cockerell, 1945)  
*Zonalictus kiviicola* (Cockerell, 1937)  
*Zonalictus knysnae* (Cockerell, 1945)  
*Zonalictus kristenseni* (Friese, 1915)  
*Zonalictus macrozonius* (Cockerell, 1937)  
*Zonalictus microzonius* (Cockerell, 1937)  
*Zonalictus minor* Blüthgen, 1929 (not *Halictus minor* Morawitz, 1876) (Named as a variety of *andreniformis*; no replacement name seems needed.)  
*Zonalictus mirandicornis* (Cockerell, 1939)  
*Zonalictus moshiensis* (Cockerell, 1937)  
*Zonalictus neavei* (Cockerell, 1946)  
*Zonalictus nefasiticus* (Cockerell, 1935)  
*Zonalictus nomioides* (Friese, 1909)  
*Zonalictus pallidicinctus* (Cockerell, 1933)  
*Zonalictus partitus* (Cockerell, 1933)  
*Zonalictus patriciformis* (Cockerell, 1933)  
*Zonalictus pearsoni* (Cockerell, 1933)  
*Zonalictus percinctus* (Cockerell, 1937)  
*Zonalictus perlucens* (Cockerell, 1933)  
*Zonalictus perpansus* (Cockerell, 1933)  
*Zonalictus promitus* (Cockerell, 1934)  
*Zonalictus pulchricinctus* (Cockerell, 1933)  
*Zonalictus pulchrihirtus* (Cockerell, 1933)  
 \**Zonalictus rufobasalis* (Alfken, 1930)  
*Zonalictus ruwensorensis* (Strand, 1911)  
*Zonalictus sidulus* (Cockerell, 1937)  
*Zonalictus stanleyi* (Cockerell, 1945)  
 \**Zonalictus subpatricius* Strand, 1911  
*Zonalictus subvittatus* (Cockerell, 1937)  
*Zonalictus tenuimarginatus* (Friese, 1925)  
*Zonalictus territus* (Cockerell, 1937)  
*Zonalictus tinctulus* (Cockerell, 1937)  
*Zonalictus tricolor* (Meade-Waldo, 1916, *nomen nudum*, not *Halictus tricolor* Lepeletier, 1841)  
*Zonalictus triflorus* (Cockerell, 1945)  
*Zonalictus unifasciatus* (Cockerell, 1937)  
*Zonalictus viridifilosus* (Cockerell, 1946)  
*Zonalictus vittatus* (Smith, 1853)  
 \**Zonalictus weisi* (Friese, 1915)  
*Zonalictus zecephalus* (Cockerell, 1937)  
*Zonalictus zaleucus* (Cockerell, 1937)

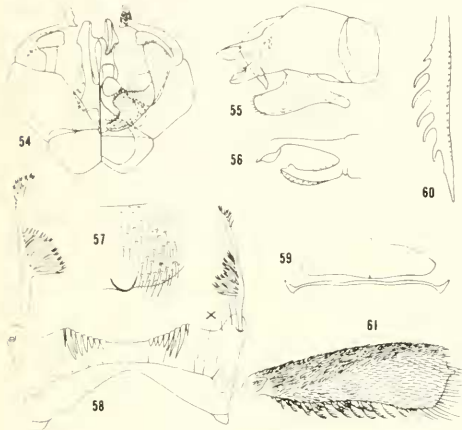
The name *Zonalictus* is based on *zone*, a belt or girdle, plus *Halictus*, with reference to the conspicuous integumental metasomal color bands of many species.

#### Genus *Pachyhalictus* Cockerell

Figures 54-68

1. Nonmetallic black, rather small, robust, 5.5-7 mm long. 2. *Frons, scutum and scutellum reticulate*

(more finely on frons), not punctate, or occasionally partly smooth or, as in *P. binghami*, with fine wrinkles and shallow punctures. 3. Clypeus neither produced downward nor protuberant forward, about three times as wide as long or wider, angle at end of truncation not or feebly produced, surface closely punctured or reticulate and dull, uniformly gently convex. 4. Line between lower ends of eyes crossing clypeus below or above middle. 5. Malar space linear. 6. Paraocular area not extending down as lobe into clypeus, lateral clypeal margins only weakly curved and at an obtuse angle to one another. 7. Mouthparts short, the short glossa exceeded by labial palpi, postpalpal part of galea not much longer than broad.



FIGS. 54-61. Structures of *Pachyhalictus* (*Pachyhalictus*). 54, 55. Dorsal, ventral, and lateral views of male genitalia of *P. (P.)* species  $\gamma$  of Blüthgen, 1926. 56. Posterior lateral view of gonostylus of same. 57. Median part of seventh tergum of same. 58. Fourth sternum of same, with detached giant seta in different view (X indicates a damaged area, reconstructed in drawing). 59. Seventh and eighth sterna of same. 60. Inner hind tibial spur of female of *P. (P.) merescens*. 61. Outer surface of hind tibia of same.

8. Pronotum with horizontal dorsal surface medially one half (in *P. retigerus*) to one third as long as flagellar width, often densely tomentose, margined anteriorly in middle only by sharp declivity of pronotal surface, but laterally by carina or lamella. 9. Dorsolateral angle of pronotum obtuse, but formed by strong anteriorly or upward directed carina or lamella which extends across posterior pronotal lobe. 10. Anterior extremity of scutum sharply angular in profile, the largely impunctate vertical or overhanging anterior zone rising well above pronotum and sometimes separated from rest of scutal surface by a carina. 11. Preepisternal groove well developed. *Metapleura strongly narrowed below*, where narrowest less than one third as wide as at upper end. Metanotum tomentose. 12. Dorsal surface of propodeum slightly shorter than to longer than scutellum, usually coarsely

areolate, sometimes irregularly coarsely striate, intervals or areolae dull or in *P. retigerus* shining. Triangular area not or scarcely defined. Lateral and posterior propodeal surfaces with short hairs in addition to long ones, these surfaces usually areolate. Posterior surface of propodeum usually margined all the way around by carinae, but *P. binghami* and *retigerus* without carina across summit or on upper parts of sides. 13. Apical wing veins strong. Recurrent veins entering second and third submarginal cells near apices, first sometimes almost interstitial; in *P. retigerus* both recurrences entering cells at apical third or fourth. (One specimen seen lacking first transverse cubital, another lacking second; species with only two submarginal cells may exist.) 14. Third submarginal cell short, third transverse cubital vein straight or arcuate, not sinuate or in *P. retigerus* feebly so. 15. Stigma of moderate size. Marginal cell with free part less than twice as long as part subtended by submarginal cells, apex appendiculate, minutely truncate to pointed, apex separated from wing margin by less than to more than two vein widths. 16. First metasomal tergum much broader than long. 17. Terga II, III, and sometimes IV with strong basal bands of pale tomentum, without apical fasciae. 18. Apical margins of terga broadly, weakly depressed with hairs and punctation usually about as on more anterior parts of same terga; hairs not or scarcely directed laterally; only very narrow tergal margins impunctate, pallid, and hairless (broad marginal zones impunctate when discs of terga are also largely impunctate as for terga I and II of *P. retigerus*). Discs of terga II and III sometimes with oblique hairs.

*Male*. 19. Clypeus and legs without yellow or white areas. 20. Labrum nearly or over four times as wide as long, fringed with bristles, without apical process. Mandible simple. 21. Flagellum short, all but last two or three segments broader than long or middle segments about as broad as long, first segment much broader than long. 22. Basitibial plate absent (present in *P. retigerus*). 23. First two hind tarsal segments distinct or fused, but point of union indicated by strong constriction. 24. Metasoma robust, shaped about as in female. 25. Pygidial plate small, defined by carina which curves forward laterally, so that it margins the plate both laterally and apically. 26. Sternum IV broadly emarginate posteriorly, median part much shortened, hidden by III, thickened, with an apical series of erect bristles on each side of midline (Blüthgen's species  $\gamma$ ) and often with an enormous lateral bristle (sometimes hooked as in *bihamatus*) (armature of sternum IV probably highly variable among species, bristles sometimes entirely hidden by sternum III). Sternum V gently emarginate apically (at least in species  $\gamma$  and *P. retigerus*). 27. Sterna VII and VIII much reduced, membranous, VII a slender transverse strip in species  $\gamma$ , with small median apical projection in *P. retigerus*, VIII damaged, but apparently hairless and without significant apical projection. 28. Genitalia broad with somewhat narrow gonobase; gonostylus ornate, main part deeply bifid, as long as gonobase; retrorse, membranous,



basal lobe itself bilobed, one part extending distad, the other mesad. Penis valve slender, inferior basal process subtruncate (based on Blüthgen's species *γ* and on *P. retigerus*).

*Female*: 29. Scape reaching or nearly reaching anterior margin of anterior ocellus. Second, often first, and sometimes other flagellar segments broader than long. 30. Labrum with tapering apical process with keel, body of labrum much more than twice as wide as long. 31. Hind tibia rather robust, lower surface and therefore lower margin as seen from side gently concave, scarcely so in *P. retigerus*, outer surface largely covered with rather short, nearly erect hairs of uniform length, upper surface with short bristles; lower margin on outer surface with long, coarse, hairs, especially those of basal half of the tibia with more numerous, crowded, and coarser branches than in most halictids, all directed toward apex of tibia. 32. Basitibial plate of moderate size, triangular to rounded apically, margin elevated, surface dull, shining in *P. retigerus*, with some hairs. 33. Inner hind tibial spur pectinate with a few coarse to many fine teeth. Hind tibia without or with one short tibial spine. 34. Sterna and ventral parts of terga with plumose hairs which in some Indoaustralian species are large, richly plumose, and important scopal structures.

*Pachyhalictus* resembles *Homalictus* in the peculiar shape and vestiture of the hind tibia of the female and some species even have such a large ventral metasomal scopa as to suggest *Homalictus*. In many ways, however, *Pachyhalictus* differs from *Homalictus*, e.g., the robust body, basal bands of tomentum on the terga, and strong second recurrent and third transverse cubital veins. In this feature of venation and in the shortened, largely hidden fourth metasomal sternum of the male, *Pachyhalictus* resembles *Patellapis*, from which it differs in the structure of the tibia of the female, basal bands of tomentum, etc. The bifid gonostyli also suggest a relationship to *Patellapis*. The distinctive reticulate sculpturing of *Pachyhalictus* is found in a very few species of *Patellapis* and *Zonalictus*.

*Pachyhalictus* is found principally from the Asiatic tropics and nearby islands to New Guinea. One species (*P. stirlingi*), however, occurs in northern Australia. Another, *P. retigerus*, morphologically differentiated but clearly a member of the genus, occurs in southeastern Africa.

KEY TO THE SUBGENERA OF *Pachyhalictus*

1. Inner hind tibial spur of female coarsely pectinate with three to six long teeth; basitibial plate of male absent or nearly so; first two hind tarsal segments of male fused ..... *Pachyhalictus s. str.*
- .... Inner hind tibial spur of female finely pectinate with more than 12 slender teeth; basitibial plate of male present; first two hind tarsal segments of male articulated ..... *Dictyohalictus*

Subgenus *Pachyhalictus* Cockerell, s. str.

Figures 54-61

*Halicti nomiiformes* Vachal, 1894, Ann. Mus. Civ. Genova, 34:428 (part); Blüthgen, 1926, Zool. Jahrb., Abt. Syst., Geogr. Biol. Tiere, 51:400; Blüthgen, 1931, Zool. Jahrb., Abt. Syst., Geogr. Biol. Tiere, 61:286.

*Pachyhalictus* Cockerell, 1929, Ann. Mag. Nat. Hist., (10)4:589. Type species: *Halictus merescens* Cockerell, 1919, original designation.

Recurrent veins entering second and third submarginal cells near apices or the first interstitial. Third transverse cubital vein arcuate or nearly straight. Basitibial plate of male absent or indicated only apically. First two hind tarsal segments of male fused, but point of union indicated by strong constriction. Fourth sternum of male with an enormous lateral bristle hidden by the tergum, at least in species that have been dissected. Inner hind tibial spur of female pectinate with three to six long, coarse teeth.

*Pachyhalictus s. str.* is restricted to the Indoaustralian region, ranging from Ceylon and India eastward to the Philippines and Taiwan and through Indonesia, New Guinea, to northern Australia. The following is a list of species names, all new combinations in *Pachyhalictus*, based on Blüthgen (1926, 1928, 1931) plus my examinations of type material. Synonymies are those of Blüthgen, not re-evaluated here.

*Pachyhalictus (Pachyhalictus)*

*assamicus* (Blüthgen, 1926)

*Pachyhalictus (Pachyhalictus) bedanus*

(Blüthgen, 1926)

\**Pachyhalictus (Pachyhalictus)*

*bihamatus* (Blüthgen, 1926)

*Pachyhalictus (Pachyhalictus)*

*binghami* (Kirby, 1900)

- \**Pachyhalictus* (*Pachyhalictus*)  
*burmanus* (Blüthgen, 1926)  
*Pachyhalictus* (*Pachyhalictus*)  
*buruanus* (Blüthgen, 1926)  
*Pachyhalictus* (*Pachyhalictus*)  
*celebensis* (Blüthgen, 1931)  
*Pachyhalictus* (*Pachyhalictus*)  
*dapanensis* (Blüthgen, 1926)  
*Pachyhalictus* (*Pachyhalictus*)  
*formosicola* (Blüthgen, 1926)  
\**Pachyhalictus* (*Pachyhalictus*)  
*interstitialis* (Cameron, 1903)  
\**Pachyhalictus* (*Pachyhalictus*)  
*intricatus* (Vachal, 1894)  
(=*thoracicus* Friese, 1914)  
*Pachyhalictus* (*Pachyhalictus*) *javanus*  
(Blüthgen, 1926)  
\**Pachyhalictus* (*Pachyhalictus*)  
*kalutarae* (Cockerell, 1911)  
(=*amplicollis* Friese, 1918)  
*Pachyhalictus* (*Pachyhalictus*) *kocki*  
(Blüthgen, 1931)  
\**Pachyhalictus* (*Pachyhalictus*)  
*liodomus* (Vachal, 1894)  
(=*scopipes* Friese, 1918)  
*Pachyhalictus* (*Pachyhalictus*)  
*lombokensis* (Blüthgen, 1926)  
*Pachyhalictus* (*Pachyhalictus*)  
*merescens* (Cockerell, 1919)  
*Pachyhalictus* (*Pachyhalictus*)  
*murbanus* (Blüthgen, 1931)  
*Pachyhalictus* (*Pachyhalictus*)  
*negrivicus* (Blüthgen, 1926)  
*Pachyhalictus* (*Pachyhalictus*)  
*penangensis* (Blüthgen, 1926)  
*Pachyhalictus* (*Pachyhalictus*)  
*pseudothoracicus* (Blüthgen, 1926)  
*Pachyhalictus* (*Pachyhalictus*)  
*puangensis* (Cockerell, 1937)  
\**Pachyhalictus* (*Pachyhalictus*)  
*reticulosus* (Dalla Torre, 1896)  
(=*Halictus reticulatus* Vachal,  
1894, not Robertson, 1892)  
\**Pachyhalictus* (*Pachyhalictus*)  
*sigiriellus* (Cockerell, 1911)  
*Pachyhalictus* (*Pachyhalictus*) *stirlingi*  
(Cockerell, 1910)

- \**Pachyhalictus* (*Pachyhalictus*)  
*sublustrans* (Cockerell, 1919)  
*Pachyhalictus* (*Pachyhalictus*)  
*trizonulus* (Friese, 1909)  
\**Pachyhalictus* (*Pachyhalictus*) *validus*  
(Bingham, 1903)  
*Pachyhalictus* (*Pachyhalictus*) *vanajus*  
(Blüthgen, 1926)  
\**Pachyhalictus* (*Pachyhalictus*) *vinctus*  
(Walker, 1860)

Of these species, *P. binghami* from Christmas Island in the Indian Ocean, is most distinctive, differing from ordinary *Pachyhalictus* in the less prominent reticulate pattern on the head and thorax (scutum has shallow punctures and fine wrinkles, thus intermediate between punctate and reticulate), and in the propodeal surface pattern (dorsal surface not areolate, with fine longitudinal wrinkles between which surface is dull; carinae margining posterior surface reaching only three fourths of distance to upper margin of that surface).

#### *Dictyohalictus* new subgenus

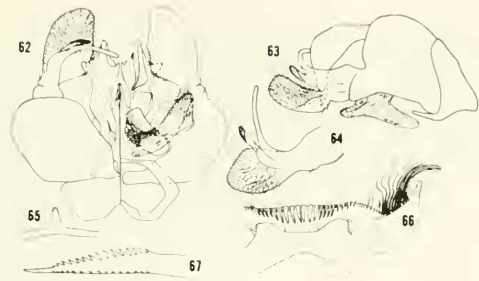
Figures 62-68

Type species: *Halictus retigerus* Cockerell, 1940.

Recurrent veins entering second and third submarginal cells well before apices. Third transverse cubital vein slightly sinuate. Basitibial plate of male present. First two hind tarsal segments of male distinct, although articulation broader than that between second and third segments. Fourth sternum of male with a slender, posteriorly directed lobe at each side, hidden by the tergum, but without a lateral bristle. Inner hind tibial spur of female finely pectinate with more than a dozen rather short, slender teeth.

This subgenus is known only from southeastern Africa. It appears to contain only a single species, *Pachyhalictus* (*Dictyohalictus*) *retigerus* (Cockerell), new combination, but there are several synonyms as indicated in the Appendix.

The name *Dictyohalictus* is based on *diktyon*, a net, plus *Halictus*, with reference to the reticulate sculpturing of the head and thorax.



Figs. 62-67. *Pachyhalictus (Dictyohalictus) retigerus*. 62, 63. Dorsal, ventral and lateral views of male genitalia. 64. Posterior dorsal view of male gonostylus. 65. Median part of seventh sternum of male. 66. Fourth sternum of male. 67. Inner hind tibial spur of female.

## Genus *Thrincohalictus* Blüthgen

### Figures 69-77

*Thrincohalictus* Blüthgen, 1955, Bull. Research Council Israel (B, Biol., Geol.), 5:20.

Type species: *Halictus prognathus* Pérez, 1912, by original designation and monotypy.

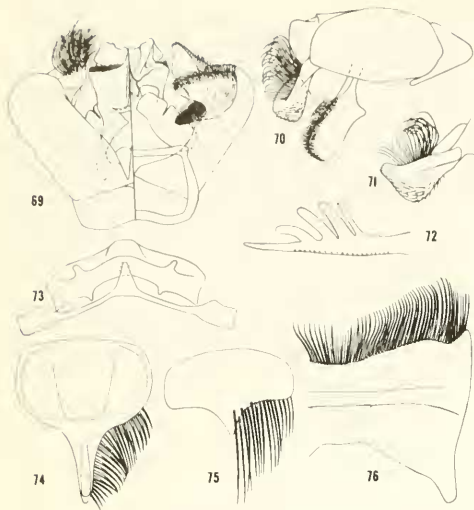
1. Nonmetallic black, moderately robust, length 9-10 mm. 2. Punctuation of the usual sort, rather fine and dense. 3. Clypeus strongly produced downward and protuberant forward, almost twice as broad as long (female) to little broader than long (male), with shining but roughened ground between irregular punctures, upper part flat in profile; angle at end of truncation weakly produced and rounded or absent in male. 4. Line between lower ends of eyes crossing above middle of clypeus (female) or entirely above clypeus (male). 5. Malar area conspicuous, about half as long as basal mandibular width (female) to longer than basal mandibular width (male). 6. Paraocular area extending down as strong lobe into clypeus. 7. Mouthparts long and slender, glossa linear and much exceeding palpi and galea, but galea elongate, post-palpal part about four times as long as wide, and labial palpus about half as long as glossa. 8. Pronotum with horizontal, dorsal surface less than one half as long medially as flagellar width, tomentose, margined anteriorly by angle where pronotal surface becomes declivous. 9. Dorsolateral angle of pronotum obtuse, a rounded ridge, but no carina extending downward from it. 10. Anterior extremity of scutum strongly convex in profile, the largely impunctate, vertical, anterior zone rising well above pronotum and curving uninterruptedly onto dorsal surface. 11. Pre-episternal groove well developed. Metanotum tomentose anteriorly. 12. Dorsal surface of propodeum about as long as metanotum, triangular area ill-defined and rather finely areolate or striate. Area behind triangle and lateral and posterior propodeal surfaces with few short hairs in addition to long ones.



FIG. 68. Face and wing of female of *Pachyhalictus (Dictyohalictus) retigerus*. Scale line = 1.0 mm.

Posterior and lateral surfaces of propodeum not areolate, separated by carinae only below. 13. Apical wing veins strong. Recurrent veins entering second and third submarginal cells at distal third or fourth. 14. Third submarginal cell somewhat elongate, third transverse cubital vein distinctly sinuate, being arcuate toward wing apex posteriorly and toward wing base anteriorly. 15. Stigma of moderate size. Marginal cell of the usual shape, free part much less than twice as long as part subtended by marginal cells, apex pointed, separated from wing margin by about a vein width or less. 16. First metasomal tergum broader than long. 17. Basal tergal tomentum absent or nearly so. 18. Terga with apical bands of pale plumose hair as in *Halictus*. Tergal margins broadly depressed, with punctuation finer than on discs of terga, both hairs and punctures ending before margins proper, which are smooth and bare; hairs of marginal bands not or scarcely directed laterally; integument of marginal bands translucent brownish.

*Male*: 19. Apex of clypeus and areas on femora, tibiae, and tarsi yellowish white. 20. Labrum slightly over twice as wide as long, with small apical process; long bristles scattered over marginal part of process, not limited to marginal row; no keel. Mandible simple. 21. Flagellum elongate, segments over 1.5 times as long as wide except for first which is wider than long. 22. Basitibial plate absent. 23. First two hind tarsal segments articulated, base of second not or scarcely broader than base of third. 24. Metasoma rather robust, but nearly parallel sided, segments II and III widest. 25. Pygidial plate not defined by carina, its position occupied by a median projection or tubercle which has hairs like those of adjacent areas, but above which is an ill-defined bare area. 26. Sternum IV shorter than adjacent sterna and largely hidden, its posterior margin fringed with long, curved bristles directed posteriorly, lateral part without a special elongate lobe or bristle. Sternum V with apical margin broadly and strongly emarginate, extreme side with a pencil of extremely long, curved, apparently fused hairs hidden under sides of terga.



FIGS. 69-76. *Thrincohalictus prognathus*. 69-70. Dorsal, ventral and lateral views of male genitalia. 71. Posterior lateral view of male gonostylus. 72. Inner hind tibial spur of female. 73. Seventh and eighth sterna of male. 74, 75. Labrum of female and male. 76. Fourth sternum of male.



FIG. 77. *Thrincohalictus prognathus*. Face of male, face and wing of female. Scale line = 1.0 mm.

27. Sternum VII a slender transverse bar with a median apical pointed process. Sternum VIII a transverse band, somewhat broadened and sclerotized medially. 28. Genitalia rather broad with narrowed base. Gonostylus rather simple, little over half length of gonocoxite, with large dense tuft of hairs near inner margin, with large, hairy "retorse" ventral lobe which, however, is largely directed ventro distally, but with small arm directed mesobasally. Penis valve with inferior basal process broadly rounded apically.

*Female:* 29. Scape reaching to middle of anterior ocellus. First flagellar segment slightly longer than wide. 30. Labrum with keeled apical process narrow; body of labrum rounded apically, about 1.3 times as wide as long. 31. Hind tibia and scopa of the usual form. 32. Basitibial plate rather large, about one fourth as long as tibia, distinctly margined, surface largely hairy. 33. Inner hind tibial spur pectinate with four or five long coarse teeth. Hind tibia with two strong, apical spines. 34. Sterna with rather long hairs, many of them with a few branches.

*Thrincohalictus* resembles *Halictus s. str.* in its general appearance, apical tergal bands, yellow markings on the clypeus and legs of males, short and rather simple gonostylus of the male, etc. It differs from *Halictus* in the elongate head, including the malar area, labrum, and proboscis, the

short fourth sternum of the male armed with coarse bristles apically, and the large retrorse lobe of the male genitalia. In these features it resembles *Thrinchostoma*, from which it differs, however, in so many features that there appears to be no close relationship. The fourth sternum of the male and the reduced angles at the ends of the clypeal truncation of the female suggest a relationship to the *Thrinchostoma-Patellapis-Zonalictus-Pachyhalictus* group rather than to *Halictus* and *Lasioglossum*. Among these genera, the similarity appears closest to *Patellapis*, some species of which have apical tergal hair bands and an elongate head and mouthparts (*P. braunsella*), but the simple gonostyli, shorter sternum VIII, almost complete lack of the pygidial plate of the male, yellow markings of the male, as well as the manner of head elongation (with long malar area) and other features distinguish *Thrincohalictus* from *Patellapis*.

*Thrincohalictus* contains only one known species, *T. prognathus* (Pérez, 1912), new combination, which ranges from the Armenian S.S.R. and Iran to the Aegean islands (Chios) and south to Israel. Its distinctiveness from relatives in Africa and tropical Asia and its distribution is suggestive of another monotypic genus, *Exoneuridia*, the only north temperate al-lodopine bee.

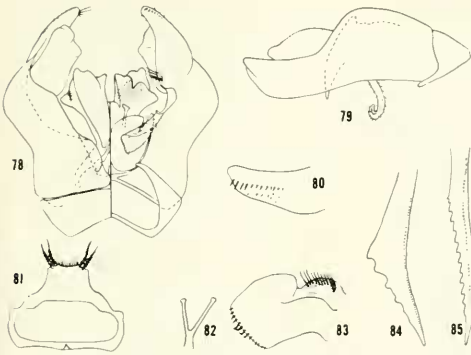
Genus *Thrinchostoma* Saussure

Figures 2, 78-87

1. Nonmetallic black or part of metasoma and legs, or even whole body, yellowish red; large and rather slender, 8-16 mm long. 2. Punctuation of the usual sort, rather fine and often dense. 3. *Clypeus strongly produced downward and strongly protuberant forward*, 0.94 to 2.5 times as broad as long, with shining ground between punctures, upper part flat in profile. 4. Line between the lower ends of the eyes crossing clypeus above middle, much above the middle except in *T. afasciatum*, or even entirely above clypeus. 5. *Malar area conspicuous*, as long as eye and nearly four times as long as basal mandibular width to less than one third as long as basal mandibular width. 6. *Paraocular area extending down as a strong lobe into clypeus*. 7. Mouthparts long and slender, glossa linear and much exceeding the short galea and palpi. 8. Pronotum with horizontal dorsal

except in *T. afasciatum*, usually not extending laterally as far as transmetanotal suture and pit. Area behind triangular area and lateral and posterior propodeal surfaces with short hairs in addition to scattered long ones. Posterior surface of propodeum margined by carinae only below, rather sharply rounding onto dorsal surface. 13. Apical wing veins strong. *Recurrent veins usually both entering third submarginal cell*, but first recurrent sometimes interstitial or entering distal extremity of second submarginal cell. 14. Third submarginal cell of moderate length, third transverse cubital vein straight or in *Eothrinchostoma*, sinuate. 15. Stigma rather small and slender. Marginal cell rather slender, free part less than twice as long as part subtended by submarginal cells, apex minutely truncate and appendiculate. 16. First metasomal tergum about as long as broad. 17. Basal tergal bands of tomentum as well as apical fasciae of plumose hairs absent. 18. Apical margins of terga I-IV to III-IV of females and I-V to III-V of males usually broadly depressed, impunctate, with *golden to whitish simple hairs directed laterally*, forming bands that are conspicuous in certain lights, except in *T. afasciatum*.

*Male*: 19. Commonly apex of clypeus, labrum, tarsi, sometimes tibiae and rest of clypeus, yellowish white. 20. Labrum with strong apical process margined with bristles, without keel. Mandible simple. 21. Flagellum elongate, segments longer than broad, first shorter than the others, apical segment often flattened and curved (not expanded), sometimes pointed. (A few species of *Thrinchostoma s. str.* have male antennae only 12-segmented, but they are otherwise typical members of their species group, see Blüthgen, 1930.) 22. Basitibial plate not or scarcely recognizable. *Hind tibia with pallid inner apical enlargement which carries the tibial spurs far from basitarsus and from one another*. 23. First two hind tarsal segments fused, a weak constriction indicating point of union. 24. Metasoma rather elongate, parallel sided or widest at third or fourth segment. 25. Pygidial plate represented by a smooth, shining area, *not delimited by a carina either posteriorly or laterally*, this smooth area curving over onto reflexed ventral part of tergum VII. 26. Sternum IV broadly emarginate posteriorly, median part much shortened and hidden or nearly so by III (except in *T. orchidarum*), but lateral parts extending far posteriorly. Sternum V weakly to strongly emarginate apically, with basal transverse thickening or raised area, sometimes spiculate or with large pegs or hooked bristles, this thickening often hidden under IV and absent in *T. orchidarum*; sternum VI often with basal elevation frequently exposed by emargination in V. 27. Sternum VII a slender, transverse bar with median apical pointed process. Sternum VIII large with broad, truncate apical process provided with hairs. 28. Genitalia with general form of a typical halictid, the gonobase somewhat narrow, the gonocoxites broad. Gonostylus large and elaborate, half as long to as long as gonocoxite, with ventral basal membranous lobe reflexed mesally or downward and dorsal mesal membranous flap or area. Penis valve



FIGS. 78-85. Structures of *Thrinchostoma*. 78, 79. Dorsal, ventral and lateral views of male genitalia of *T. (Eothrinchostoma) producta*. 80. Posterior lateral view of gonostylus of same. 81. Eighth sternum of same. 82. Inferior basal process of penis valve of *T. (Thrinchostoma) sjostedi*. 83. Posterior lateral view of male gonostylus of same. 84, 85. Inner hind tibial spur of female of *T. (T.) afasciatum* and *T. (E.) producta*.

surface one half to twice as long medially as flagellar width, densely tomentose, margined anteriorly by an angle or carina, almost on same level as and not overhung by anterior part of scutum. 9. Dorsolateral angle of pronotum obtuse or right angular, a rounded ridge but no carina extending downward from it. 10. *Anterior extremity of scutum gently convex*, without subvertical zone separated by angle from most of scutal surface. 11. Pre-episternal groove less conspicuous than in most Halictinae, short and shallow below scrobal groove. Metanotum incompletely tomentose. 12. Dorsal surface of propodeum much longer than metanotum, sometimes as long as scutellum. Dorsal, bare, triangular area of propodeum finely to coarsely striate to granular, rather small

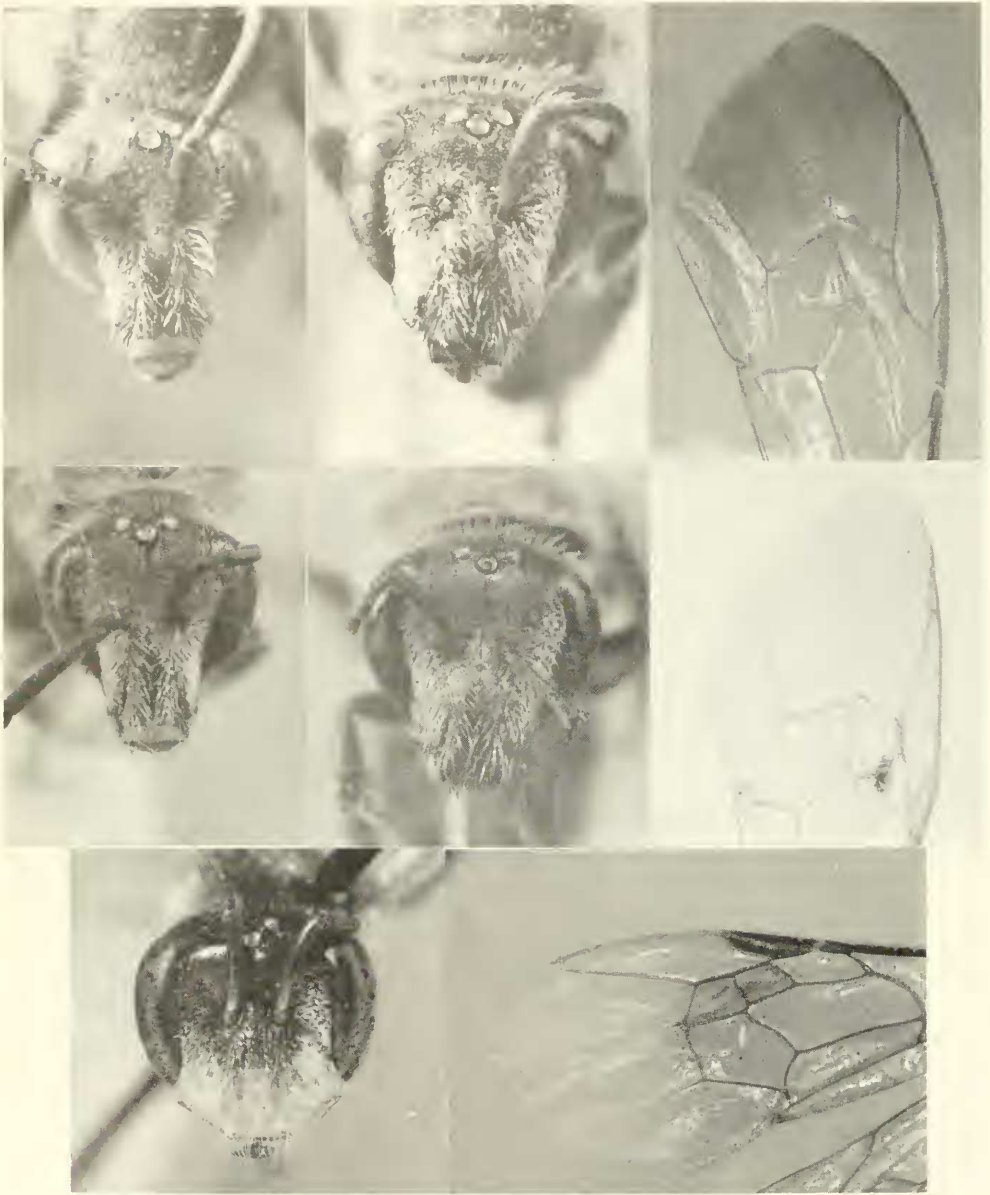


FIG. 86. Top row: *Thrinostoma (Eothrinostoma) producta*, face of male, face and wing of female. Middle row: *Thrinostoma (Thrinostoma) sjostedi*, face of male, face and wing of female. Bottom row: *T. (T.) afasciatum*, face and wing of holotype female. Scale line = 1.0 mm.

with inferior basal process very slender, capitate or bifid. (Genitalia and hidden sterna examined only for *Thrinostoma s. str.* and *Eothrinostoma*.)

*Female*: 29. Scape reaching beyond anterior ocellus; first flagellar segment longer than wide. 30. Labrum with moderate to broad tapering apical process with keel; body of labrum less than twice as wide as long. 31. Outer surface of hind tibia with hairs

largely simple, usually some branched hairs along upper margin and large curved branched hairs along basal half of lower margin. (Hairs most branched in *Eothrinostoma*, intermediate in *Thrinostoma s. str.*, nearly all simple in *Diagonozus*.) 32. Basitibial plate small, triangular, elevated above surrounding area, but without marginal ridge, surface smooth, with scattered pits, or with large grooves. 33. Inner

hind tibial spur rather finely serrate or with broad median tooth beyond which it is coarsely toothed. Hind tibia with one long, slender, tibial spine. 34. Sterna without distinctive scopa.

The Asiatic species of *Thrinchostoma* were reviewed by Blüthgen (1926), the African species, by the same author (1930). Various species have been described since those dates, however.

#### KEY TO THE SUBGENERA OF *Thrinchostoma*

1. Forewing without an area of dense hairs along second transverse cubital vein, this vein simple and straight; first transverse cubital arising far from base of vein r and margin of stigma; sternum IV of male with a series of enormous simple setae arising from margin both medially under sternum III and laterally, under the lateral extremity of tergum IV, where the setae are largest ..... *Eothrinchostoma*
- .... Forewing with an area of dense hairs near median part of second transverse cubital vein, in males these hairs forming conspicuous dark spot; second transverse cubital vein usually angulate or thickened medially, sometimes incomplete (not reaching marginal cell); first transverse cubital arising very near margin of stigma; sternum IV of male without coarse, specialized setae ..... 2
2. Head extraordinarily produced below eyes, malar area nearly as long as or longer than eye, several times as long as basal width of mandible .... *Diagonozus*
- .... Head only moderately produced below eyes, malar area much shorter than eye, three times as long as basal width of mandible or less .....  
..... *Thrinchostoma s. str.*

#### Subgenus *Eothrinchostoma* Blüthgen

Figures 78-81, 85, 86

*Eothrinchostoma* Blüthgen, 1930, Mitt. Zool. Mus. Berlin, 15:501.

Type species: *Halictus torridus* Smith, 1879, designation of Sandhouse, 1943, Proc. U. S. Nat. Mus., 92:548.

Clypeus moderately produced below lower ends of eyes; malar area about as long as wide. Fore wing without area of dense hairs on second transverse cubital vein. First transverse cubital arising well away from margin of stigma so that vein r is nearly as long as anterior margin of second submarginal cell; third submarginal cell strongly narrowed anteriorly (i.e., toward costal margin of wing), anterior margin less than half as long as posterior margin; second transverse cubital vein nearly straight, not angulate or thickened, complete. Inner hind tibial spur of female with inner margin rather finely and uniformly serrate, each tooth occupying about as much space as three of the very fine teeth on other margin. Fourth metasomal sternum of male with apical row of enormous bristles, bent near apices, smaller medially where they arise under the margin of sternum III, larger laterally where the bases are under the lateral margins of tergum IV, and smaller again near apices of lateral processes, also under lateral margins of tergum IV. Sternum V with a pair of similar large discal bristles. Sternum VI with preapical thickening which is densely hairy posteriorly, the hairy area narrowly divided by longitudinal hairless band.

This subgenus is more like ordinary halictids than the other subgenera in its wing venation and lack of a hair spot on the wings. Moreover, its male antennae and other features do not exhibit the special features found in many species of *Thrinchostoma* proper. *Eothrinchostoma* is presumably more primitive than and probably ancestral to *Thrinchostoma s. str.*

*Eothrinchostoma* ranges widely over tropical Africa, southward to Natal. The following is a list of species:

- malelanum* Cockerell, 1937
- manyemae* Cockerell, 1932
- patricium* (Strand, 1910)
- silvaticum* Blüthgen, 1930
- torridum* (Smith, 1879)
- wellmani* Cockerell, 1908

Subgenus *Thrinchostoma* Saussure s. str.

Figures 2, 82-84, 86

*Thrinchostoma* Saussure, 1890, in A. Grandidier, Histoire Physique, Naturelle et Politique de Madagascar, 20(1):52.

Type species: *Thrinchostoma venitantly* Saussure, 1890 (monobasic).

*Trichostoma* Dalla Torre, 1896, Catalogus Hymenopterorum, 10:381 (unnecessary emendation of *Thrinchostoma*); Friese, 1909, Die Bienen Afri-

kas, p. 150, in L. Schultze, Zoologische und Anthropologische Ergebnisse einer Forschungsreise im westlichen und zentralen Südafrika, vol. 2, part 2.

*Thrinchostoma* Dalla Torre, 1896, *Catalogus Hymenopterorum*, 10:641 (unnecessary emendation of *Thrinchostoma*).

*Trinchostruma* Sladen, 1915, *Canad. Ent.*, 44:214 (unnecessary emendation of *Thrinchostoma*).

*Rostratilapis* Friese, 1914, *Tijd. Ent.*, 57:26.

Type species: *Halicetus* (*Rostratilapis*) *macrognathus* Friese, 1914, designation of Sandhouse, 1943, *Proc. U. S. Nat. Mus.*, 92:597.

*Nesothrinchostoma* Blüthgen, 1933, *Mitt. Zool. Mus. Berlin*, 18:364.

Type species: *Thrinchostoma serricorne* Blüthgen, 1933 (monobasic).

Clypeus but little (*T. afasciatum*) to moderately produced below lower ends of eyes; malar area one third to three times as long as wide. Fore wing with area of dense hairs near middle of second transverse cubital vein, these hairs forming conspicuous dark spot (minute in *T. serricorne*) in males. First transverse cubital vein arising very near to stigma so that vein *r* is short (about twice as long as vein width in *T. serricorne*) or virtually absent; third submarginal cell only moderately narrowed anteriorly (i.e., toward costal margin of wing), anterior margin over half as long as posterior margin; second transverse cubital vein at least slightly angulate medially in area of dense hairs, sometimes absent anterior to that point, usually also thickened medially. Inner margin of inner hind tibial spur markedly widened near middle by broad obtuse tooth, beyond which margin is coarsely toothed (Fig. 84 for *afasciatum*) to almost smooth and edentate. Sternum IV of male often with long setae on posterior lateral prolongations, but without row of very coarse setae, but such setae often present on basal thickening of sternum V. Sternum VI usually unmodified.

*T. orchidarum* should be restudied and its genitalia examined for possible distinctive features (type in British Museum). In this species, which is more hairy than others, the sterna II to IV are similar in form; IV is broadly exposed, but somewhat shorter than the preceding ones. Sterna II to IV each bears a preapical fringe of long hairs, broken medially. Sternum V has no basal thickening, and has a dense continuous preapical fringe. Thus, the sterna are less modified than usual in the genus.

This subgenus is widespread in tropical Africa southward to Natal, in Madagascar and in tropical Asia from south India and

Assam eastward to Vietnam, Kalimantan and Java.

The following is a list of included species:

- aciculatum* Blüthgen, 1928
- afasciatum* new species
- affine* Blüthgen, 1928
- albitarse* Blüthgen, 1933
- amanicum* (Strand, 1910)
- assamense* Sladen, 1915
- atrum* Benoist, 1962
- bequaerti* Blüthgen, 1930 and form *ochropus* Blüthgen, 1930
- bibundicum* (Strand, 1910) and form *tessmanni* Strand, 1912
- bryanti* Meade-Waldo, 1914
- castaneum* Benoist, 1945
- conjungens* Blüthgen, 1933
- emini* Blüthgen, 1930
- flaviscapus* Blüthgen, 1926
- fulvipes* Blüthgen, 1933
- fulvum* Benoist, 1945
- insulare* Benoist, 1962
- joffrei* Benoist, 1962
- kandti* Blüthgen, 1930
- lemuriae* Cockerell, 1910
- lualienae* Cockerell, 1939
- macrognathum* Friese, 1914 and form *brunneum* Blüthgen, 1926
- michaelis* Cockerell, 1932
- millari* Cockerell, 1916
- mwangai* Blüthgen, 1930
- nachtigali* Blüthgen, 1930
- obscurum* Blüthgen, 1933
- orchidarum* Cockerell, 1908
- othonnae* Cockerell, 1908
- perineti* Benoist, 1962
- petersi* Blüthgen, 1930
- productum* (Smith, 1853)
- renitantly* Saussure, 1891
- rugulosum* Benoist, 1962
- sakalavum* Blüthgen, 1930
- serricorne* Blüthgen, 1933
- sjostedti* (Friese, 1908) and form *rufescens* (Friese, 1908)
- sladeni* Cockerell, 1913



*telekii* Blüthgen, 1930  
*tokinense* Blüthgen, 1926  
*ugandae* Blüthgen, 1930  
*umtaliense* Cockerell, 1936  
*undulatum* Cockerell, 1936  
*vachali* Blüthgen, 1930  
*wissmanni* Blüthgen, 1930

### Subgenus *Diagonozus* Enderlein

#### Figure 87

*Diagonozus* Enderlein, 1903, Berlin Ent. Zeitschr., 48:35. Type species: *Diagonozus bicometes* Enderlein (monobasic).

Lower part of head enormously produced so that head is about as long as thorax; clypeus entirely below lower ends of eyes; malar area about four times as long as basal width of mandible, nearly as long as eye to longer than eye. Fore wing as described for *Thrinchostoma s. str.*, but third submarginal cell with anterior margin about half as long as posterior margin, second transverse cubital vein unusually strongly angulate and thickened. Inner hind tibial spur as described for *Thrinchostoma s. str.*



FIG. 87. *Thrinchostoma (Diagonozus) lettow-vorbecki*. Face and side view of head of female. Scale line = 1.0 mm.

Males have not been seen by me although described by Blüthgen (1930).

Another distinctive character of the subgenus is the more elongate pronotum, the dorsal surface of the elevated portion on the midline being considerably longer than the diameter of an ocellus. In other subgenera this length is little if any longer than an ocellar diameter. The proboscis of

*Diagonozus* is also extremely long, although relative to the very long head it is little or any longer than that of *Thrinchostoma s. str.* *Diagonozus* appears to be a derivative of *Thrinchostoma s. str.*, recognizable primarily by the elongate head and proboscis.

*Diagonozus* is known from tropical west Africa. Included species are as follows:

*bicometes* (Enderlein, 1903)  
*ghesquierei* Cockerell, 1932  
*guineense* Blüthgen, 1930  
*lettow-vorbecki* Blüthgen, 1930

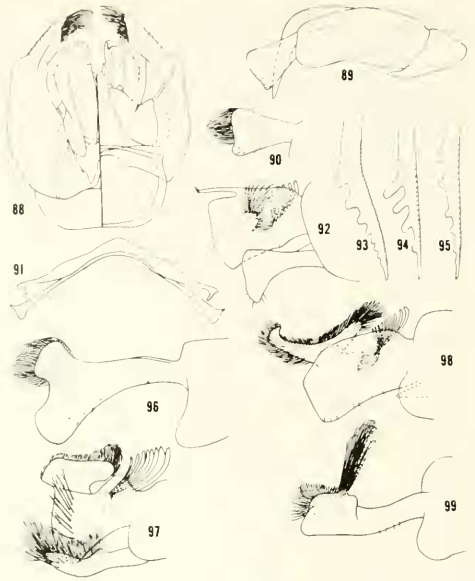
### Genus *Halictus* Latreille

#### Figures 3-5, 88-101

1. Nonmetallic black or with body dull greenish or bluish, metasoma sometimes partly or wholly red; body length 3.5 to 17 mm.
2. Punctuation of the usual sort, often fine and dense, but surfaces sometimes shining with widely separated punctures.
3. Clypeus of females and some males not much produced or protuberant, but in some males strongly produced downward and protuberant forward, nearly four times as wide as long (e.g., female of *H. squamosus*) to less than twice as wide as long (males of various species), angle at end of truncation strongly produced in female, usually acute as seen from front, absent in male; surface usually with shining interspaces among punctures, usually distinctly more convex near apex than near base.
4. Line between lower ends of eyes usually crossing clypeus near or above middle, but variable, in *H. squamosus* near lower margin of clypeus.
5. Malar area linear or in some males nearly half as long as wide, widest near anterior margin.
6. Paraocular area not extending down as lobe into clypeus or at most forming an obtuse or right angular lobe.
7. Distal parts of proboscis short, glossa not much longer than labial palpi or postpalpal part of galea.
8. Pronotum with subhorizontal dorsal surface medially about one third as wide as flagellar diameter, often minutely tomentose, margined anteriorly only by declivity of pronotal surface and sometimes sloping anteriorly so that it merges with the declivous surface.
9. Dorsolateral angle of pronotum usually obtuse, sometimes right angular, not lamellate or strongly carinate, a ridge extending toward posterior lobe of pronotum, but usually not extending across lobe, another ridge (rounded in most *Vestitohalictus*) extending down from dorsolateral angle.
10. Anterior extremity of scutum strongly convex in profile, the largely impunctate vertical anterior zone rising well above pronotum, usually rounding onto dorsal surface, but rarely with a sharp angle between anterior and dorsal surfaces,

anterior zone strongly bilobed in *H. squamosus* because of deeply impressed longitudinal median line of front part of scutum. 11. Pre-episternal groove often short and shallow below scrobal groove. Metanotum tomentose or not. 12. Dorsal surface of propodeum longer than metanotum, shorter than to as long as scutellum, striate to granular. Triangular area sometimes defined by end of striate or granular zone, variable in extent. Lateral and posterior surfaces of propodeum without conspicuous short hairs in addition to long ones, not areolate. Posterior surface of propodeum margined by carinae, if at all, only below, or rarely these carinae reaching upper end of posterior surface (as in *H. sexcinctellus*). 13. Apical wing veins strong. Recurrent veins entering second and third submarginal cells or rarely first recurrent nearly interstitial with second transverse cubital. 14. Third submarginal cell somewhat elongate, third transverse cubital strongly arcuate posteriorly, straight or nearly so anteriorly, the whole vein often sinuate. 15. Marginal cell rather slender to robust, free part equal to or longer than part subtended by submarginal cells, apex narrowly truncate to pointed on wing margin. 16. First metasomal tergum broader than long or in some males longer than broad. 17. Terga with or without basal areas or bands of tomentum. 18. Terga with apical bands of pale plumose hair (sometimes only laterally), or rarely entire surface uniformly covered with such hair. Apical margins of terga broadly depressed, with punctation somewhat finer than on more anterior parts of terga, but punctation continuous nearly to posterior borders, at least on more anterior terga, hairs not or not strongly directed laterally, posterior margins of terga dark to transparent. Disc of tergum II sometimes with oblique hairs.

*Male*: 19. Clypeus, labrum, and legs usually with yellow areas, tegula sometimes with yellow. 20. Labrum over three times as wide as long, rarely less than twice as wide as long, fringed with bristles, without apical process. Mandible simple. 21. Flagellum elongate, middle segments well over 1.5 and often over 2.0 times as long as wide. 22. Basitibial plate absent or sometimes vaguely recognizable as a flattened area of the usual shape, but in no case defined by a carina. 23. First two, hind, tarsal segments apparently articulated, but base of second broader than base of third. 24. Metasoma rather slender, usually parallel sided, segments I to IV almost equally broad although II and III slightly wider than others. 25. Pygidial plate defined only at apex by a carina, the carina not curving forward and defining the plate laterally, smooth area in front of apical carina sometimes small, broader than long, but often extending far toward base of tergum forming a longitudinal shiny band, sometimes elevated to form a shining ridge, in *H. maculatus* narrowed to a longitudinal carina. 26. Sterna IV and V truncate (i.e., unmodified) to broadly emarginate, without coarse bristles. 27. Sterna VII and VIII each with median apical projection, sometimes as in *H. maculatus* blunt and short, that of VIII almost absent in



FIGS. 88-99. Structures of *Halictus*. 88, 89. Dorsal, ventral and lateral views of male genitalia of *Halictus* (*Halictus*) *ligatus*. 90. Posterior lateral view of gonostylus of same. 91. Seventh and eighth sterna of same. 92. Posterior lateral view of male gonostylus, *H. (Seladonia) confusus*. 93-95. Inner hind tibial spurs of females of *H. (H.) ligatus*, *latisignatus*, and *maculatus*. 96-99. Posterior lateral views of male gonostyli of *H. (H.) scabiosae*, *quadricinctus*, *rubicundus*, and *patellatus*.

*H. parallelus* and even emarginate in *H. farinosus*, the projections usually hairless, but either or both may bear hairs. 28. Genitalia rather broad with somewhat narrow base. Gonostylus rather simple with hairy apical or subapical dorsal lobe or elaborate with one or two clumps of bristles on inner surface, some species (subgenus *Seladonia* and *H. quadricinctus*) with a "second stylus" arising ventrolateral to major one, this being the homologue of the retrorse lobe of many halictids but directed apically rather than basally; therefore *gonostylus without retrorse ventral basal lobe*. Penis valve moderately slender, inferior basal process rather slender, rounded apically, inconspicuous.

*Female*: 29. Scape usually reaching posterior ocelli or even beyond, rarely only attaining anterior ocellus or in a few species (*H. desertorum*, *placidulus*) not reaching anterior ocellus. Second flagellar segment broader than long to at least as long as broad, first and middle flagellar segments broader than long to much longer than broad. 30. Labrum with tapering apical process with keel; body of labrum usually more than twice as broad as long, rarely less than twice as broad as long, bigibbous, the two gibbosities sometimes merged. 31. Hind tibia and its scopula of the usual form. 32. Basitibial plate of moderate size, angular to rounded apically, margin elevated or absent on anterior side in *Ictiophalictus*, surface dull,

TABLE 1. Major Differences between *Halictus* and *Lasioglossum s.l.*

Feature	<i>Halictus</i>	<i>Lasioglossum</i>
distal wing veins	strong	weak
apical tergal hair bands	of densely plumose hairs	absent or rarely of weakly plumose hairs
inferior basal process of penis valve	inconspicuous, slender rounded at apex	broad, truncate or obliquely truncate
inferior basal retrorse lobe of male gonostylus	absent or if present, directed apically, not retrorse	commonly present, membranous, minutely hairy

with some hairs. 33. Inner hind tibial spur coarsely serrate to pectinate. Hind tibia with one or two apical spines. 34. Sternal hairs plumose, of moderate length.

Unlike the other genera described in this paper, *Halictus* is primarily developed in the palearctic region, where it contains many species. One subgenus (*Seladonia*) is abundant throughout Africa and a very few species reach southern India. In the Western Hemisphere only about ten species occur in North and Central America and only three reach South America although one *Seladonia* is found as far south as Brazil.

*Halictus* is closely related to the major group of halictines in which the distal wing veins are weakened, the genus *Lasioglossum s.l.* *Lasioglossum* is not treated in this paper, but it seems important to indicate some of the main features by which *Halictus* and *Lasioglossum* differ, since some authors still prefer to unite these genera. Distinctive features are indicated in Table 1.

KEY TO THE SUBGENERA OF *Halictus*

- 1. Basitibial plate of female slender and not or feebly defined on anterior margin; hairless triangular area of propodeum small, not reaching posterior margin of dorsal surface of propodeum even medially. (Pubescence unusually dense and white; integument black or greenish.) ..... *Vestitohalictus*

- .... Basitibial plate of female of the usual shape and defined by a ridge or carina anteriorly as well as posteriorly; hairless triangular area of propodeum larger, nearly always reaching posterior declivity medially ..... 2
- 2. Integument nonmetallic, black; gonostylus of male single (double in *H. quadricinctus* and allies) ..... *Halictus*
- .... Integument, at least of head and thorax, metallic greenish or bluish; gonostylus of male double; i.e., two apparently separate gonostyli on apex of gonocoxite, the outer inferior one equivalent to the retrorse lobe of some halictids, but directed apically and in *H. hesperus* and *lutescens* much reduced ..... *Seladonia*

Subgenus *Seladonia* Robertson

Figures 6, 92

*Seladonia* Robertson, 1918, Ent. News, 29:91.

Type species: *Apis seladonia* Fabricius, 1794, by original designation.

*Pachyceble* Moure, 1940, Arq. Zool. Est. São Paulo, 2:54.

Type species: *Pachyceble lanei* Moure, 1940, by original designation and monotypy.

Length 4.5 to 10 mm. Integument of body dull greenish, sometimes bluish or brassy, that of metasoma sometimes nonmetallic black or brownish. Pubescence not especially dense or widespread although occasionally as in *H. niveocinctulus* tending to spread between basal and apical tergal bands and thus suggestive of *Vestitohalictus*. Ridge extending down from lateral angle of pronotum sharply angulate or carinate. Apex of marginal cell pointed. Basitibial plate of female defined by a ridge both anteriorly and posteriorly; inner hind tibial spur of female pectinate

with long or short teeth. Triangular area of propodeum ample in size, reaching posterior declivity medially, not margined by densely punctate area. Male gonostylus double (outer, inferior "stylus" reduced, but present in *H. lutescens* and *H. hesperus* of the American tropics); major gonostylus usually with a clump of coarse setae on inner surface.

This is the most widespread subgenus of *Halictus*, being found in the Holarctic region, south in the Western Hemisphere to Brazil, in Africa to the Cape of Good Hope, and into India and Southeast Asia. It is morphologically compact and unified.

The following is a list of species names placed in *Seladonia*:

- abuensis* Cameron, 1908  
*adolphi-frederici* Strand, 1911  
*aeneobrunneus* Pérez, 1895  
*aerarius* Smith, 1873  
*atroviridis* Cameron, 1906  
*austrovagans* Cockerell, 1932  
*banalianus* Strand, 1911  
*benguellensis* Cockerell, 1908  
*caelestis* Ebmer, 1976  
*candescens* Cockerell, 1945  
*capensis* Friese, 1909  
*centrosus* Vachal, 1910  
*cephalicus* Morawitz, 1873, and form  
*neuter* Blüthgen, 1923  
*chloropinus* Cockerell, 1946  
*confusus* Smith, 1853 and forms  
*arapahonum* Cockerell, 1906,  
*alpinus* Alfken, 1907, and  
*perkinsi* Blüthgen, 1925  
*daturae* Cockerell, 1929  
*diductus* Cockerell, 1932  
*dissensis* Cockerell, 1945  
\**dissidens* Pérez, 1903  
*duplocinctulus* Cockerell, 1940  
*eruditus* Cockerell, 1924  
*expertus* Cockerell, 1916  
\**exquisitus* Warncke, 1975  
*ferripennis* Cockerell, 1929  
\**gaschunicus* Blüthgen, 1935  
\**gavarnicus* Pérez, 1903  
*gemmeus* Dours, 1872  
*harmonius* Sandhouse, 1941  
*hesperus* Smith, 1862  
*hotoni* Vachal, 1903  
*jucundiformis* Cockerell, 1940  
*jucundus* Smith, 1853  
*kessleri* Bramson, 1879 and form  
*nebulosus* Warncke, 1975  
*komensis* Cockerell, 1939  
*lanei* (Moure, 1940)  
*laosina* Cockerell, 1929  
*laticinctulus* Cockerell, 1946  
*leucaheneus* Ebmer, 1972 and form  
*arenosus* Ebmer, 1976  
*lucidipennis* Smith, 1853  
*lutescens* Friese, 1921  
*medanicus* Cockerell, 1945  
*medaniellus* Cockerell, 1945  
\**meridionalis* Morawitz, 1873  
*mogrenensis* Cockerell, 1945  
\**mondaensis* Blüthgen, 1923  
\**mongolicus* Morawitz, 1880  
\**morinellus* Warncke, 1975  
\**mugodjaricus* Blüthgen, 1933  
*nikkoensis* Cockerell, 1911  
*niloticus* Smith, 1879  
*niveocinctulus* Cockerell, 1940  
\**occipitalis* Ebmer, 1972  
*pervirens* Cockerell, 1940  
\**petraeus* Blüthgen, 1933  
\**pjalmenis* Strand, 1909  
\**pontificus* Cockerell, 1940  
*propinquus* Smith, 1853  
*pruinescens* Cockerell, 1937  
\**secundus* Dalla Torre, 1896  
*seladonius* (Fabricius, 1794)  
*seminiger* Cockerell, 1937  
*semitectus* Morawitz, 1873  
*silvaticus* Blüthgen, 1926  
*smaragdulus* Vachal, 1895  
*speculiferus* Cockerell, 1929  
*subauratoides* Blüthgen, 1926  
*subauratus* (Rossi, 1792) and its forms  
*corsa* Blüthgen, 1933, and  
*syricus* Blüthgen, 1933  
*subincertus* Cockerell, 1940  
\**subpetraeus* Blüthgen, 1933  
*sudanicus* Cockerell, 1945

- tataricus* Blüthgen, 1933  
*tibetanus* Blüthgen, 1926  
*tokarensis* Cockerell, 1945  
*tokariellus* Cockerell, 1945  
 \**transbaikalensis* Blüthgen, 1933  
*trichiurus* Cockerell, 1940  
*tripartitus* Cockerell, 1895  
*tumulorum* (Linnaeus, 1758)  
 \**umbrosus* Cockerell, 1929  
*vansoni* Cockerell, 1935  
*varentzowi* Morawitz, 1895  
*varipes* Morawitz, 1876  
*vernalis* Smith, 1879  
 \**verticalis* Blüthgen, 1931  
*vicinus* Vachal, 1895  
*virgatellus* Cockerell, 1901  
*viridibasis* Cockerell, 1946  
 \**wollmanni* Blüthgen, 1933

### Subgenus *Vestitohalictus* Blüthgen

#### Figure 100

*Vestitohalictus* Blüthgen, 1961, Beitr. Naturk. Forsch. SW-Deutschl., 19:287.

Type species: *Halictus vestitus* Lepeletier, 1841, by original designation. (According to Ebmer, 1976b, this was a misidentification; Blüthgen actually had *H. pulvereus* Morawitz. From the practical viewpoint this is of no importance, since *pulvereus* and *vestitus* are similar species of the same subgenus. The type should stand as *H. vestitus*.)

Length 3.5 to 8 mm. Integument of body dull greenish to entirely non-metallic and black, often with metasoma partly or wholly red. Pubescence dense, white or yellowish, commonly covering entirely metasomal surface, although denser on posterior margins than elsewhere. Ridge extending down from lateral angle of pronotum rounded. Apex of marginal cell pointed on wing margin or apex separated by a vein width or more from margin. Basitibial plate of female undefined anteriorly, or if defined, plate narrow and pointed below rather than broad as in other subgenera; inner hind tibial spur of female pectinate with long or short teeth. Triangular area of propodeum small, short, not reaching posterior declivity, usually margined posteriorly and laterally by densely punctate hairy area. Male gonostylus double as in *Seladonia* or the outer "stylus" absent.

This subgenus is found in the drier parts of the Palearctic region, from the Canary Islands and the Mediterranean basin to western China. It includes minute as well as moderate sized species, some al-



FIG. 100. *Halictus (Vestitohalictus) nasica*, face and wing of female. Scale line = 1.0 mm.

most wholly white because of dense pubescence, many of them with the metasomal integument partly or wholly red.

There is much diversity in the subgenus as here delimited. The type species and its close relatives (including forms with non-metallic as well as with greenish integument) have a median apical tuft or longitudinal band of dense hair on the fourth sternum of the male, but this is absent in other species. The labrum of the female in some species is quite ordinary, but in others the body of the labrum is much longer than usual (e.g., *H. desertorum*, in which it is two thirds as long as wide). The labral process is broad and very long, about twice as long as the body of the labrum in the female of *H. nasica*. In males, also, the labrum is sometimes longer than in other *Halictus*, only somewhat over twice as wide as long as in *H. desertorum*. Variation in the male gonostylus and in the basitibial plate of the female is indicated in the subgeneric description above. The most conspicuously strange feature of any female *Halictus* is the clypeus of the minute *H. nasica* which bears a long, downward projecting median process (Fig. 100).

A. W. Ebmer (in litt., 1977) questions the placement of *H. semiticus* and *H. plu-*

*cidulus* in the following list, and says that their male genitalia are similar to those of *Seladonia*. It may be that the problem arises in part from misassociation of sexes of *H. placidulus*, for Ebmer indicates that the female holotype has a small propodeal triangle as in *Vestitohalictus* while the male has characters suggesting a relationship with *H. (Seladonia) varentzovi*. It well may be that some species intergrade with *Seladonia*. In general, however, the two subgenera seem quite distinct.

The following is a list of species that fall in the subgenus *Vestitohalictus*.

- \**aenescens* (Radoszkowski, 1893)
- \**balearicus* Pérez, 1903
- \**bulbiceps* Blüthgen, 1929
- \**concinus* Brullé, 1840
- cupidus* Vachal, 1902
- cypricus* Blüthgen, 1937
- desertorum* Morawitz, 1876
- \**fuscicollis* Morawitz, 1876 and form  
*transcaspica* Blüthgen, 1923
- \**indefinitus* Blüthgen, 1923
- \**inpilosus* Ebmer, 1975
- \**kuschkenensis* Ebmer, 1975
- \**microcardia* Pérez, 1895
- morawitsi* Vachal, 1902 and form  
*theseus* Ebmer, 1975
- mordacellus* Blüthgen, 1929
- \**mordax* Blüthgen, 1923
- mucidus* Blüthgen, 1923
- mucoreus* (Eversmann, 1852)
- nasica* Morawitz, 1876
- \**ochropus* Blüthgen, 1923
- persephone* Ebmer, 1976
- pici* Pérez, 1895
- placidulus* Blüthgen, 1923
- pollinosus* Sichel, 1860 and its forms  
*limissicus* Blüthgen, 1937 and  
*thevestensis* Pérez, 1903
- pulvereus* Morawitz, 1873, and its form  
*tectus* Radoszkowsky, 1876
- \**pseudomucoreus* Ebmer, 1975
- pseudovestitus* Blüthgen, 1925
- radoszkowskii* Vachal, 1902

- \**semiticus* Blüthgen, 1955
- sogdianus* Morawitz, 1876
- \**solitudinis* Ebmer, 1975
- \**surabadensis* Ebmer, 1975
- \**tuberculatus* Blüthgen, 1925
- \**vestitus* Lepeletier, 1841

Subgenus *Halictus* Latreille s. str.

Figures 3-5, 88-91, 93-99, 101

*Halictus* Latreille, 1804, *Nouv. Dict. Hist. Nat.*, 24: 182.

Type species: *Apis quadricincta* Fabricius, 1776, by designation of Richards, 1935 (see below).

*Odontalictus* Robertson, 1918, *Ent. News*, 29:91.

Type species: *Halictus ligatus* Say, 1837, monobasic and by original designation.

*Monilapis* Cockerell, 1931, *Ann. Mag. Nat. Hist.*, (10)7:529.

Type species: *Hylaeus tomentosus* Eversmann, 1852, monobasic and by original designation.

The type species for the name *Halictus* has been a subject of much discussion. The following designations and interpretations exist:

1. *Apis sexcincta* Fabricius, 1775, "ejusd." *Andrena rufipes* Fabricius, 1793, designation by Latreille, 1810, *Considérations générales . . . des insectes*, p. 439.
2. *Apis rubicunda* Christ, 1791, designation by Curtis, 1833, *British Entomology*, 10:448a.
3. *Apis quadricincta* Fabricius, 1776, designation by Richards, 1935, *Trans. Royal Ent. Soc. London*, 83:170.
4. *Andrena rufipes* auctorum, nec Fabricius = *Apis sexcincta* Fabricius, 1775. This is the interpretation of Latreille's designation by Warncke (1975).
5. *Andrena rufipes* Fabricius, 1793. This is the interpretation of Latreille's designation by Ebmer (1974, 1976a).

The only species included by Latreille in 1804 were *rufipes*, *quadricinctus*, and *flvipipes*. Designation number 2 is there-

fore invalid for it clearly involves a species not originally included.

The problems center around designation number 1, of which numbers 4 and 5 are interpretations. This designation is invalidated by Opinion number 136 of the International Commission on Zoological Nomenclature (1939), which takes the position that when Latreille in his tabulation of 1810 listed two or more trivial names, there was no type designation.

Even if one ignores Opinion 136, the conclusion is the same. The abbreviation "ejusd." in Designation 1 is for *ejusdem* or *ejusdemmodi*, meaning "in the same way." One might assume that this means "the same species," and that Latreille was therefore synonymizing *rufipes*, an originally included name, with *sexcinctus*, which was not included by name, but has priority, at the same time that he stated the type species. The International Code of Zoological Nomenclature [Article 69, (a) (iv)] states that if an author designates a type species using a name that was not originally included, but at the same time synonymizes that name with one of the originally included species, the designation of the latter as type species is valid. Thus Latreille's act would be considered as designation of *Apis sexcinctus* as the type species. It is irrelevant that the so-called type specimen of *Andrena rufipes* is a wasp which does not agree with the original description at all well (Ebmer, 1976a). There is no need to draw the distinction that Warncke (1975) makes between *rufipes acutorum* (the bee) and *rufipes* Fabricius (the wasp), for the wasp with the label "*rufipes*" must be a result of a probably post-Fabrician error. Under the circumstances, it is also irrelevant that *rufipes* and *sexcinctus* are not now considered synonymous (Ebmer, 1974, 1976a).

In reality, Latreille (1810) did not use "ejusd." to indicate synonymy. He listed together species that were not at all alike,

but that agreed in what he considered as generic characters. For example, for the genus *Megachile* he lists *muraria* Fab. *ejusd. lanata*, *argentata*, and *centuncularis*. These are extremely different looking species; he could not have been suggesting specific synonymy. The same is true for *Centris* where he lists *haemorrhoidalis ejusd. versicolor*, two differently colored and clearly nonsynonymous species. Thus for *Halictus*, he was evidently saying "the type is *sexcinctus*, and *rufipes* also belongs here." Since *sexcinctus* was not an originally included species, Latreille's "designation" is invalid.

Ebmer (1976a) has argued that since Latreille, in indicating the type species, listed two species, only one of which was originally included, that one (*rufipes*) is thereby designated as the type. This view does not appear to be justified by Article 69 of the International Code of Zoological Nomenclature. Moreover, as already indicated, in view of Opinion 136, all such considerations are irrelevant in any event.

Presumably, it was for the reasons outlined above that Richards made the only valid type designation, number 3 above, the species being *Apis quadricincta* Fabricius.

Warncke (1970, see also 1975) designated the same *Apis quadricincta* Fabricius as the type species of *Hylaeus*, a name proposed by Fabricius in 1793. This designation would have the effect of making *Hylaeus* available as a senior synonym of *Halictus*. Warncke's designation is invalid since Latreille in 1810 designated a different species, *Apis annulata* Linnaeus, as the type species of *Hylaeus*. This is a species belonging to the genus known in most parts of the world today as *Hylaeus*. Latreille's designation may have been unfortunate at the time, for *annulata* was the only species of its genus included by Fabricius under the name *Hylaeus*, compared to six species of Halictinae, and the name

*Hylaesus* was widely although not uniformly used at one time for the group now known as Halictini. Nonetheless, *Apis annulata* was one of the species originally included in *Hylaesus* and the designation is valid. There is no legitimacy to Warncke's argument that *Hylaesus* of Latreille is a different genus with a different type species from *Hylaesus* of Fabricius.

Length 6 to 17 mm. Integument of body non-metallic, black or brownish, the metasoma rarely partly red. Pubescence not especially dense or widespread, metasomal terga usually without basal bands of hair but with apical bands only, in the *H. senilis* group hair dense, widespread, often white. Ridge extending down from lateral angle of propotum sharply angulate or carinate. Apex of marginal cell minutely truncate to pointed on wing margin. Basitibial plate of female defined by a ridge both anteriorly and posteriorly; inner hind tibial spur of female coarse serrate to short pectinate, and the teeth long in *H. latisignatus*. Triangular area of propodeum ample in size, reaching posterior declivity medially, not margined by densely punctate area. Male gonostylus usually not double, with or without one or two tufts of coarse setae on inner surface, gonostylus double (i.e., with the equivalent of the retrose lobe projecting distally) only in *H. quadricinctus* and its immediate allies such as *H. brunneescens*.

The subgenus *Halictus* is abundant in the Palearctic region. It does not occur, however, in subsaharan Africa or in southeast Asia and only one species (*H. latisignatus*) reaches southern India. Only four species occur in North America. One of them, *H. rubicundus*, is Holarctic and one, *H. ligatus*, extends southward into the Neotropical region as far as Colombia and Trinidad.

The subgenus *Halictus* contains several diverse elements, probably as different from one another as they are from *Seladonia*. The latter subgenus, however, is easily recognized in both sexes by its greenish coloration while the groups included in *Halictus* proper are all non-metallic and the females are difficult to segregate into groups. Since for many species, only females are known or males have not been available for dissection, I have not been able to place numerous names as to group.

If the subgenus were divided now, many species would therefore not be assignable to subgenus. For this reason, subdivision has not been formally proposed. The groups, however, are distinguishable by the characters of males listed below, and are numbered 1 to 4. These numbers in front of names in the list of species indicate the groups to which certain species belong. (Since writing the above, A. W. Ebmer of Linz, Austria, the principal specialist on Palearctic halictines, has been kind enough to examine my groupings. In general, he agrees with them and has placed nearly all the species not only in these groups, but in subdivisions thereof. I leave to him the full account of groups or subgenera and placement of the species.)

### Group 1

Mandible broadened basally. First flagellar segment much broader than long; flagellum somewhat moniliform. Hypostomal area concave. Malar space present. Sternum IV with apical margin broadly concave, sternum longest at extreme sides. Gonostylus not double, somewhat expanded apically, usually with a clump of long, coarse setae on inner surface, but such setae absent in some species such as *H. simplex*.

The name *Monilapis* is available for Group 1 and could be used in a subgeneric sense except for the problem of placing species known only from females, as mentioned above. The name "tetrazonius group" has usually been used. It is a compact, Palearctic group characterized by a series of derived features. The clump of coarse setae usually arising from the inner surface of the gonostylus is probably homologous to the coarse setae on the basal extension of the preapical hairy lobe in Group 3. It is not homologous to the clump of specialized, flattened setae found in Group 3 and *Seladonia*.

### Group 2

Mandible not broadened basally. First flagellar segment slightly broader than long to longer than broad; flagellum not moniliform. Hypostomal area not concave. Malar space variable. Sternum IV sim-



ple or with margin concave, longest sublaterally so that if margin is concave, the posteriormost angles are mesal to the sides of the sternum. Gonostylus not double, relatively simple, with hairy inner apical or preapical lobe, but without a clump of long coarse setae on inner surface.

The name *Odontalictus* is available for this group, which is restricted to the Palearctic region except for *H. ligatus* which is American. The genal tooth of the female of *H. ligatus*, which led Robertson to provide the name *Odontalictus*, is not a sub-generic or group character. It is also found in some unrelated Palearctic species such as *H. modernus* and *submodernus* and even in *H. (Seladonia) wollmanni*. *H. ligatus* is in the *scabiosae* subgroup of my Group 2.

### Group 3

Agrees with Group 2 except as follows: sternum IV, if concave, longest at lateral margins as in Group 1. Gonostylus complex, with preapical, hairy lobe which often projects both basally and apically, and with clump of coarse, flattened setae on inner surface basal to the lobe; sometimes (e.g., in *H. rubicundus*) with small outer inferior "stylus," this fully developed so that the stylus appears double in *H. quadricinctus* and its allies.

The double gonostylus of *H. quadricinctus* and its allies is suggestive of that of *Seladonia*, as is the clump of specialized setae arising from the inner surface of the gonostylus, but the large, nonmetallic spe-



FIG. 101. *Halictus (Halictus) farnosus*, face of male, face and wing of female. Scale line = 1.0 mm.

cies of Group 3 and the small, greenish species of *Seladonia* do not superficially appear closely related.

The name *Halictus s. str.* is available for this group, which is restricted to the Palearctic region except for three species found in North America.

### Group 4

Mandible not broadened basally. First flagellar segment longer than broad, flagellum not moniliform. Hypostomal area not concave. Malar area linear. Sternum IV with apical margin concave, sternum widest laterally; V deeply emarginate, VI with large median hairy area. Gonostylus not double, with broad, scarcely hairy, thin lobe extending downward and slender apical process projecting in same direction, with clump of long coarse setae on inner surface, but this displaced basad relative to other species so that it arises basal to apex of gonocoxite.

This group contains only the Indian species *H. laisignatus*, which is distinguishable in the female by the small median elevation on the apical margin of the clypeus. The distinctive features have been well illustrated by Sakagami and Wain (1966).

The following is a list of species of the subgenus *Halictus*:

- \**acrocephalus* Blüthgen, 1923
- \**adjikenticus* Blüthgen, 1923
- (3) *aegyptiacus* Friese, 1916
- (1) *aegypticola* Strand, 1909
- \**albohispidus* Blüthgen, 1923
- \**albozonatus* Dours, 1872
- \**alfkenellus* Strand, 1909
- \**altaicus* Pérez, 1903
- asperatus* Bingham, 1898
- asperulus* Pérez, 1895
- \**atripes* Morawitz, 1894
- \**aureipes* Dours, 1872
- \**bagirensis* Blüthgen, 1936
- (2) *berlandi* Blüthgen, 1936
- (1) *bifidus* Warncke, 1975
- \**brunnescens* (Eversmann, 1852)
- \**bucharicus* Blüthgen, 1936
- (1) *carinthiacus* Blüthgen, 1936
- (2) *cedens* Blüthgen, 1931
- (2) *cochlearitarsis* (Dours, 1872)
- \**consobrinus* Pérez, 1895
- (2) *constantinensis* Strand, 1910
- (2) *constrictus* Smith, 1853

- (1) *\*crenicornis* Blüthgen, 1923  
*\*cyrenaicus* Blüthgen, 1930,  
*\*determinandus* Dalla Torre, 1896  
*\*dschulfensis* Blüthgen, 1936  
*\*dunganicus* Blüthgen, 1936
- (1) *\*eurygnathopsis* Blüthgen, 1936  
(1) *eurygnathus* Blüthgen, 1930  
(3) *farinosus* Smith, 1853  
(2) *\*fatsensis* Blüthgen, 1936  
*\*fimbriatus* Smith, 1853  
*formosus* Dours, 1872  
(2) *frontalis* Smith, 1853  
*fucosus* Morawitz, 1876  
(2) *fulvipes* (Klug, 1817)  
*\*fumatipennis* Blüthgen, 1924  
*\*funerarius* Morawitz, 1876  
(1) *\*furcatus* Blüthgen, 1925  
*\*georgicus* Blüthgen, 1936  
*\*gordius* Warncke, 1975  
(2) *\*graecus* Blüthgen, 1936  
(1) *\*grunwaldi* Ebmer, 1975  
*\*gusenleitneri* Ebmer, 1975  
*\*hedini* Blüthgen, 1935  
*holomelaenus* Blüthgen, 1936  
(2) *\*humkalensis* Blüthgen, 1936  
(2) *\*hybridopsis* Blüthgen, 1923  
*intumescens* Pérez, 1895  
*\*jaramielicus* Blüthgen, 1923  
*kusdasi* Ebmer, 1975  
(1) *langobardicus* Blüthgen, 1944  
(4) *latisignatus* Cameron, 1908  
*\*libanensis* Pérez, 1911  
(2) *ligatus* Say, 1837  
(2) *\*luganicus* Blüthgen, 1936  
*\*lunatus* Warncke, 1975  
*\*lussinicus* Blüthgen, 1935  
(2) *maculatus* Smith, 1848 and form  
*priesneri* Ebmer, 1975  
*\*marchali* Vachal, 1891  
*maroccanus* Blüthgen, 1933  
*\*mediterraneus* Strand, 1909  
*\*minor* Morawitz, 1876  
*\*modernus* Morawitz, 1876  
(2) *nadigi* Blüthgen, 1933  
*nicosiae* Blüthgen, 1923  
*\*ochraceovittatus* Dours, 1872  
*\*palustris* Morawitz, 1876  
(3) *parallelus* Say, 1837  
(1) *patellatus* Morawitz, 1873  
*\*penthleri* Blüthgen, 1924  
(1) *\*ponticus* Blüthgen, 1936  
*\*pseudomaculatus* Blüthgen, 1925  
*\*pseudotetrazonius* Strand, 1921  
(1) *pyrenaicus* Pérez, 1903  
(2) *\*quadricinctoides* Blüthgen, 1936  
(3) *quadricinctus* (Fabricius, 1776)  
(1) *\*quadripartitus* Blüthgen, 1923  
(3) *rubicundus* (Christ, 1791) and forms  
*mongolensis* Blüthgen, 1936,  
*laticinctus* Blüthgen, 1923, and  
*lerouxii* Lapeletier, 1841  
(3) *rufipes* (Fabricius, 1793)  
*sajoi* Blüthgen, 1923  
(1) *\*samarensis* Blüthgen, 1936  
(2) *scabiosae* (Rossi, 1790) and form  
*powelli* Cockerell, 1931  
(1) *\*scardicus* Blüthgen, 1936  
*\*sefidicus* Blüthgen, 1936  
*senilis* (Eversmann, 1852)  
*sepositus* Cockerell, 1921  
(2) *sexcinctus* (Fabricius, 1775)  
(1) *\*siculus* Blüthgen, 1925  
(1) *simplex* Blüthgen, 1923 (= *ibex*  
Warncke, 1973)  
*squamosus* Lebedev, 1910  
*\*stachii* Blüthgen, 1923  
(2) *\*subalfkenellus* Blüthgen, 1936  
*submodernus* Blüthgen, 1936  
(2) *\*subsenilis* Blüthgen, 1955  
*\*takuiricus* Blüthgen, 1936  
(1) *tetrazonianellus* Strand, 1909  
(1) *tetrazonius* Klug, 1817  
*tibialis* Walker, 1871  
*\*tomentosus* (Eversmann, 1852)  
*\*tridivisus* Blüthgen, 1923  
*\*tsingtouensis* Strand, 1910  
*\*turanicola* Dalla Torre, 1896  
(2) *\*turkomannus* Pérez, 1903  
*\*wagneri* Blüthgen, 1937  
(1) *wjernicus* Blüthgen, 1936  
*yarkandensis* Strand, 1909

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I am especially pleased to acknowledge the help of P. Andreas W. Ebmer of Linz, Austria, with regard to the lists of species of *Halictus*. Not wishing to detract from his future publications, I have not incorporated all the information which he provided relative to groupings, synonymies, and the like, but I have incorporated many additions and corrections received from him.

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## APPENDIX

The following are new species described so that their characters can be incorporated into the descriptions in the body of this paper, plus certain other taxonomic notes that relate to these bees.

*Patellapis (Patellapis) braunsella*  
new species

Figures 27, 29-33, 44

In its elongate head and associated features such as the long glossa and the lobe of the paracocular area cutting into the clypeus, this species differs from all other *Patellapis*. *P. (Lomatalictus) pastina* has

a moderately elongate head and a somewhat long glossa, but these features are less extreme than in *P. braunsella* and must be independently evolved. *P. braunsella*, as shown by the subgeneric characters, is more closely related to *P. schultzi* and *P. minutior*. It is the size of the latter, but differs in many ways including the head shape and associated characters listed above and the more elongate and crenulate antennal flagellum.

*Female*: Length 8 mm; forewing length 6.5 mm. Black with dark brown on middle of mandible, under side of flagellum, and small segments of tarsi; apices of metasomal terga and sterna II to IV broadly pallid translucent. Wings clear, veins and stigma rather light brown.

Pubescence dull white, moderately abundant and long, plumose but not as heavily so as in *P. malachurina*, especially long (much longer than eye width) on genal area; longest hairs on basal half of scape nearly half as long as scape; first metasomal tergum with apical white hair band restricted to sides; base of tergum II, especially laterally, with scattered plumose white hairs (the closest approach to basal bands of tomentum found in the genus); terga II-IV with broad, well defined, dense apical hair bands. Hair of fifth tergum orange red, fading to white laterally. Tibial and tarsal hairs yellowish white, yellower on under sides of tarsi; clypeal fringe and hairs of mandible similarly yellow; penicillus orange yellow.

Head slightly longer than broad (188:162); upper and lower interorbital distances as 104:100. Clypeus slightly over twice as wide as long (98:42); line between lower ends of eyes crossing clypeus near upper margin; paracocular area extending down into clypeus as an approximately right angular lobe. Malar space linear. Inner orbits convergent below, except for upper parts, which are convergent above. Antennal sockets separated by less than diameter of a socket. Antennocular:interantennal:antennocellar:interocellar:ocellocular distances as 32:12:52:39:24. Labrum with convex body about twice as wide as long and apical pointed process shorter than body. Frontal carina ending well below level of lower margins of antennal sockets. Upper part of genal area wider than eye, area widest at upper third of eye and narrowing to almost nothing in lateral view at lower end of eye. Glossa as long as head. Scape reaching to level of upper margin of lateral ocellus; first flagellar segment about as broad as long, second broader than long, others longer than broad. Dorsolateral pronotal angles obtuse; a ridge, but no carina, extending across pronotal lobe. Dorsal surface of propodeum shorter than scutellum, separated from posterior surface by a moderately sharp angle, no distinct carina defining posterior surface laterally although several minute ridges mark the lateral limit of that surface below. Basitibial plate

rather narrowly rounded apically. Inner margin of inner hind tibial spur minutely serrate-pectinate or ciliate.

Clypeus and lower part of paraocular area shining with irregular, large, well separated punctures. Supra-clypeal area minutely roughened, dull, with smaller punctures separated by over a puncture width. Frons and vertex finely and densely strigose-punctate. Genal area more coarsely and shallowly strigose. Hypostomal area nearly smooth, shining, flat. Scutum dull, minutely and closely punctured; scutellum and metanotum with much coarser punctures on a minutely roughened but shining ground. Sides of thorax and propodeum minutely reticulate or punctate with scattered large, shallow punctures. Dorsal part of propodeum minutely roughened and dull, the triangular area with a coarser pattern of fine, radiating striae laterally, medially on basal half or more of triangle such striae anastomosing to form irregular small areolae. Metasomal terga somewhat shining, but surfaces minutely roughened, especially on more posterior terga, almost without such roughening on dorsolateral swellings in front of depressed margins of terga I and II; punctuation rather fine, coarsest on above mentioned swellings, progressively finer and sparser on marginal areas, where densest punctures separated by about a puncture width. Sterna shining, but minutely roughened, hairs arising from papillae.

*Male*: Length 8 mm; wing length 6.5 mm. Coloration as in female but mandibular apices, under side of flagellum, and pygidial plate and adjacent areas red brown; all exposed terga and sterna except seventh tergum with broadly pallid, translucent apices.

Pubescence as described for female, but all tergal hair bands weak middorsally and even laterally not as dense as in female; terga V and VI without hair bands; base of II without tomentum. No red hair at apex of metasoma. Sterna I-IV with apical fringes of hair, sternum V with area of dense hair at each side subapically. Hair of legs, clypeal margin, and mandible nearly as white as that of body. Under sides of all trochanters and femora with particularly long white hairs; under side of hind femur except apex densely covered with such hairs, some nearly half as long as femur, mostly directed basad.

Head longer than broad (180:159) upper and lower interorbital distances as 102:82. Clypeus width: length::78:44. Line between lower ends of eyes crossing clypeus above middle. Paraocular lobe, malar space, convergence of orbits, and separation of antennal sockets as in female. Antennocular: interantennal:antennocellar:interocellar:ocellular distances as 27:12:48:40:26. Labrum with strongly convex, shining body twice as wide as long and small obtuse angle representing apical process. Frontal carina, genal area, glossa as in female. Scape reaching middle of anterior ocellus; first flagellar segment much broader than long, others longer than broad (second over 1.5 times as long as broad), median ones crenulate. Pronotum and propodeum as in female. Basitibial plate defined by strong carina, but plate much more slender than in female and therefore with angulate apex. Sternum IV hidden by third, with row of about 22 bristles

arising from premarginal thickening, lateral ones enormous and lying flat, others progressively smaller toward median ones, middle 12 bristles or thereabouts bent at about level of apical sternal margin and thereafter erect. Sternum V with apical margin broadly emarginate between sublateral lobes.

Punctuation similar to that of female, but on clypeus and lower part of paraocular area denser; hypostomal area minutely roughened, not smooth and impunctate. Propodeum with minutely areolate or reticulate part of triangle extending almost to posterior margin. Tergal punctuation somewhat finer than in female, punctures of first two terga separated by about a puncture width, ground shiny and smooth; more posterior terga progressively more roughened and less punctate.

Holotype male, Willowmore, Cape Province (Capland on the label), South Africa, February 1, 1905 (Dr. Brauns). Allotype female, same locality and collector, May 15, 1905. Two female paratypes, May 4 and 15, 1905 and two male paratypes, August 25, 1906 and October, 1910.

The holotype and allotype are in the Transvaal Museum, Pretoria, South Africa; a pair of paratypes is in the Snow Entomological Museum, University of Kansas, and the other pair in the British Museum (Natural History).

This species is named for the collector, the late Dr. H. Brauns, formerly of Willowmore, Cape Province.

*Pachyhalictus (Dictyohalictus) retigerus*  
(Cockerell)

Figures 62-68

*Halictus retigerus* Cockerell, 1940, Ann. Mag. Nat. Hist., (11)5:88.

*Halictus weenenicus* Cockerell, 1941, Ann. Mag. Nat. Hist., (11)8:205 (new synonym).

*Halictus latifrontosus* Cockerell, 1946, Entomologist, 79:43 (new synonym).

*Halictus crassinervis* Cockerell, 1946, Entomologist, 79:183 (new synonym).

Examination of types in the British Museum indicated that the specific names listed above are synonymous. The types of the last three were all taken at the same locality in Natal, South Africa, by the same collector. The name *crassinervis* is based on males, the others on females. The locality for the first name listed is in Rhodesia.

The following locality record extends the range to another country: one female, Vipya Plateau, 12 miles northeast of Mzimba, Malawi, 5200 feet altitude, 15 April 1967 (C. D. Michener).

*Thrinchostoma* (*Thrinchostoma*)  
*afasciatum* new species

Figures 84, 86

This species is described here because it has certain characters not otherwise found in the genus which must therefore be accounted for in the generic description. The short malar space, only one third as long as broad or perhaps less, distinguishes this species from all others except *T. sladeni* Cockerell (see Blüthgen, 1926) from Assam. The most remarkable feature, however, is the lack of the bands of pale (usually silvery), laterally directed hairs on the posterior marginal areas of the metasomal terga. Such bands characterize all other species of the genus. The incompletely described *T. bryanti* Meade-Waldo, 1914, also from Borneo, could be the male of *T. afasciatum*. It has black head and thorax, probably lacks radiating striae in the propodeal triangle, and thus seems likely to be different although the description says nothing of the apical tergal bands.

*Female*: Length 9.5 mm. Head brownish black; labrum, malar area, clypeus, and lower part of paracocular area testaceous, this color grading into the dark color of rest of head, supraclypeal area and hypostomal area being largely reddish brown. Mandible testaceous except for dark brown apex. Antenna brownish black except base of scape and under sides of segments 7-12 testaceous. Thorax and legs testaceous except for mesoscutum which is dusky brownish, grading to testaceous posteriorly. Wings yellowish, veins and stigma dusky brown, at extreme wing bases testaceous, also veins forming marginal cell beyond stigma and beyond third transverse cubital vein testaceous. First metasomal tergum and narrow basal bands on terga 2-4 testaceous; broad apical bands on terga 1-4 transparent so that basal testaceous bands on terga 2-4 show through; rest of metasomal dorsum brownish black; metasomal venter brown, testaceous basally.

Hair of head dull yellowish white, some of long hairs dusky in certain lights; subappressed plumose hairs almost hiding surface of lower part of paracocular

area laterally; short subappressed hairs also abundant, but not obscuring surface on rest of paracocular area, frons, vertex and genal areas; long, simple, mostly suberect hairs present on most of head, unusually long, yellowish, and strongly directed forward on supraclypeal area, clypeus, mandible, hypostomal area, and lower genal area. Thoracic hair colored like that of head, short whitish hairs abundant on pleura, sides and posterior face of propodeum, and on metanotum; longer erect hairs mostly simple and dusky in certain lights dorsally, paler and often coarsely plumose laterally. Hairs of legs pale testaceous, golden on under sides of tibiae and tarsi. Metasomal hair dull yellowish white, long erect dorsal hairs dusky in certain lights; transparent marginal bands of terga 1-4 with only scattered, short, laterally directed hairs.

Head broader than thorax, clypeus 2.5 times as broad as long, not much produced downward nor protuberant anteriorly; inner orbits not strongly converging below (Fig. 86); line tangent to lower ends of eyes only a little above middle of clypeus; antennal sockets separated by more than diameter of a socket; antennocular distance about twice diameter of antennal socket; malar area about three times as wide as shortest length; mandible long, less strongly curved than in the forms with a more produced clypeus; first flagellar segment slightly longer than broad, middle segments markedly so. Interocellar distance much less than ocellular distance. Genal area about as broad as eye seen from side. Glossa distinctly longer than length of head, apical fourth without long hairs. Inner hind tibial spur as in Figure 84. Scutellum bigibbous; dorsum of propodeum longer than scutellum. Forewing with basal vein and m-cu interstitial; submarginal cells as in Figure 81; hairs denser around the medially thickened second transverse cubital vein than elsewhere.

Clypeus and supraclypeal area shining, with coarse punctures, some of them longitudinally elongate, irregularly placed, but mostly about a puncture width apart; rest of head and thorax with minute punctures, widely separated on scutum, the center of which is shining and impunctate, scutellar gibbositities also shining and impunctate; sides of thorax mostly minutely roughened and dull; propodeal triangle large, nearly reaching declivity, with strong, regular, radiating ridges. Metasomal terga grading from the first which is shining with only scattered minute punctures to the fifth which has a dull surface and scattered small punctures; posterior transparent margins of terga I-IV impunctate, shining on tergum I, progressively duller on succeeding terga.

Holotype female: Pontianak, Borneo (Kalimantan, Indonesia) (F. Muir) in the collection of the Bishop Museum, Honolulu.

The specific name is based on *a*, without, plus *fasciatus*, banded, with reference to the lack of apical tergal bands of later-

ally directed silvery or golden hairs, characteristic of other species of the genus.

*Halictus (Seladonia) lutescens* Friese, 1921

*Halictus ruae* Cockerell, 1949, Proc. U. S. Nat. Mus., 98:446 (new synonym).

Type of *ruae* in National Museum of Natural History, Washington, D.C.

#### LITERATURE CITED

- BLÜTHGEN, P. 1920, 1921. Die deutschen Arten der Bienengattung *Halictus* Latr. Deutsche Ent. Zeitschr., 1920:81-132, 1921:267-302.
- . 1923a. Beiträge zur Kenntnis der Bienengattung *Halictus* Latr. Arch. Naturg., 89(2):232-332.
- . 1923b. Beiträge zur Systematik der Bienengattung *Halictus* Latr. Kono-wia, 2:65-142.
- . 1924. Contribución al conocimiento de las especies españolas de "*Halictus*." Mem. Real Soc. Española Hist. Nat., 11:331-544.
- . 1925. Die Bienengattung *Nomioides* Schenck. Stettiner Ent. Zeitung, 86: 1-100.
- . 1926. Beiträge zur Kenntnis der indo-malayischen *Halictus*- und *Thrin-costoma*-Arten. Zool. Jahrb. (Syst., Geogr. Biol. Tiere), 51:375-698, pls. 4-5.
- . 1928. Beiträge zur Kenntnis der indo-malayischen *Halictus*- und *Thrin-costoma*-Arten, 1. Nachtrag. Zool. Jahrb. (Syst., Geogr. Biol. Tiere), 54: 343-406.
- . 1931. Beiträge zur Kenntnis der indo-malayischen *Halictus*- und *Thrin-costoma*-Arten. Zool. Jahrb. (Syst., Geogr. Biol. Tiere), 61:285-346.
- . 1934. 1. Nachtrag zur Monographie der Bienengattung *Nomioides* Schenck. Stettiner Ent. Zeitung, 95:238-283.
- EBMER, A. W. 1969. Die Bienen des Genus *Halictus* Latr. s.l. im Grossraum von Linz. Naturkundliches Jahrbuch der Stadt Linz, 133-183.
- . 1974. Von Linné bis Fabricius beschriebene westpaläarktische Arten der Genera *Halictus* und *Lasioglossum*. Nachrichtenbl. Bayerischen Ent., 23: 111-127.
- . 1976a. *Halictus* und *Lasioglossum* aus Marokko. Linzer Biol. Beitr., 8: 205-266.
- . 1976b. Liste der mitteleuropäischen *Halictus*- und *Lasioglossum*-Arten. Linzer Biol. Beitr., 8:393-405.
- EICKWORT, G. C. 1969. A comparative morphological study and generic revision of the augochlorine bees. Univ. Kansas Sci. Bull., 48:325-524.
- LATREILLE, P. A. 1810. Considerations générales sur l'ordre naturel des animaux composant les classes des crustacés, des arachnides, et des insectes. Schoell, Paris.
- MICHENER, C. D. 1951. Halictidae in C. F. W. Muesebeck, K. V. Krombein and H. K. Townes, Hymenoptera of America North of Mexico—Synoptic Catalog, U. S. Dept. Agric. Monogr. no. 2.
- . 1978. The parasitic groups of Halictidae (Hymenoptera, Apoidea). Univ. Kansas Sci. Bull., 51:291-339.
- SAKAGAMI, S. F. AND F. L. WAIN. 1966. *Halictus latisignatus* Cameron: a polymorphic Indian halictine bee with caste differentiation. Jour. Bombay Nat. Hist. Soc., 63:57-73.
- SANDHOUSE, G. A. 1941. The American bees of the subgenus *Halictus*. Ent., Americana, (ns)21:23-39.
- WARNCKE, K. 1970. Beitrag zur Systematik und Verbreitung der Bienengattung *Prosopis* F. in der Westpaläarkt. Bull. Recherches Agronom. Gembloux, (NS)5:754-768.
- . 1975. Beitrag zur Systematik und Verbreitung der Furchenbienen in der Türkei. Polskie Pismo Ent., 45:81-128.
- WILLE, A. AND C. D. MICHENER. 1971. Observations on the nests of Costa Rican *Halictus* with taxonomic notes on Neotropical species. Rev. Biol. Tropical, 18:17-31.